



# **NAVAL POSTGRADUATE SCHOOL**

**MONTEREY, CALIFORNIA**

## **THESIS**

**INFORMATION DOMINANCE: INFORMATION'S ROLE  
IN INFLUENCING DECISION MAKING**

by

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March 2014

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**INFORMATION DOMINANCE: INFORMATION'S ROLE IN INFLUENCING  
DECISION MAKING**

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## **ABSTRACT**

Information is the single most important part of the decision-making process. There are many theories and models of decision-making processes that apply to general decisions, and others that are for very specific purposes. No single theory/model applies to all decisions. This thesis identifies several relevant theories/models that are both general and specific, and explores each process and how information works within and through it to reach a decision. This exposes commonalities that all the theories/models share. They are identification of the scene, the desired end state, and how to reach the desired end state. The successful use of a theory/model requires the person(s) choosing to utilize a theory/model to address one or more of these common criteria to reach the best decision possible. Additionally, the type of situation and the personalities of the person(s) making the decision impact that decision. The person(s) making the decision should understand and know this information and how it influences the decision-making process. Information influences the decision-making process by influencing how the common criteria are answered, how a decision maker responds to the information environment effects, and the selection of the model/theory used to reach a decision.

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## TABLE OF CONTENTS

<b>I.</b>	<b>INTRODUCTION.....</b>	<b>1</b>
<b>A.</b>	<b>BACKGROUND .....</b>	<b>1</b>
<b>B.</b>	<b>PURPOSE.....</b>	<b>2</b>
1.	Primary Research Questions .....	2
2.	Secondary Research Questions.....	3
<b>C.</b>	<b>SCOPE .....</b>	<b>3</b>
<b>D.</b>	<b>ORGANIZATION OF THE THESIS .....</b>	<b>4</b>
<b>II.</b>	<b>DECISION MAKING: THEORIES AND MODELS .....</b>	<b>7</b>
<b>A.</b>	<b>THEORIES.....</b>	<b>8</b>
1.	Expected Utility and Expected Value Theory .....	8
2.	Economic Human and Rational Man.....	9
3.	Naturalistic Decision Making.....	11
4.	Decision Making under Risk.....	13
5.	Routine Decision Making .....	17
6.	Explanation Based Decision Making.....	22
<b>B.</b>	<b>MODELS .....</b>	<b>22</b>
1.	Recognition Primed Decision Making Model.....	22
2.	Observe-Orient-Decide-Act Loop and the Critique-Explore- Compare-Adapt Loop.....	25
3.	Information Operations.....	30
<b>C.</b>	<b>CONCLUSION .....</b>	<b>33</b>
<b>III.</b>	<b>INFLUENCE-MANIPULATING THE INFORMATION .....</b>	<b>35</b>
<b>A.</b>	<b>INFORMATION ENVIRONMENT .....</b>	<b>36</b>
1.	Physical Dimension .....	36
2.	Cognitive Dimension .....	37
3.	Informational Dimension .....	38
<b>B.</b>	<b>THE DECISION MAKING PICTURE .....</b>	<b>39</b>
1.	How the World is Seen .....	39
2.	Mechanics of the Picture .....	40
3.	Public Opinion.....	41
4.	In the Picture .....	42
5.	Facts of the Psychological Life Space.....	43
<b>C.</b>	<b>INFLUENCE TECHNIQUES .....</b>	<b>46</b>
1.	Rumors-A Corrosive Force.....	46
2.	The Techniques of Influence .....	47
a.	Landscaping .....	49
b.	Source Credibility.....	51
c.	Effective Message.....	53
d.	Emotional Tactics .....	54
3.	Overcoming Resistance-Omega Strategies .....	56
a.	Reactance-Fear of Change .....	58

b.	<i>Skepticism-Why Change?</i>	59
c.	<i>Inertia-Do Not Change</i>	61
d.	<i>Omega Synopsis</i>	62
4.	<b>Social Norms-A Tool of Influence</b>	62
D.	<b>CONCLUSION</b>	65
IV.	<b>ANALYSIS-THEORIES, MODELS AND INFLUENCE</b>	67
A.	<b>INTRODUCTION</b>	67
B.	<b>SIMILARITIES AND DIFFERENCES</b>	68
1.	<b>Similarities</b>	68
2.	<b>Differences</b>	69
C.	<b>LENS OF COMPARISON</b>	70
1.	<b>Situation</b>	70
2.	<b>Common Criteria</b>	72
3.	<b>Decision Maker</b>	73
D.	<b>ANALYSIS CONCLUSION</b>	75
E.	<b>TABLES</b>	77
V.	<b>CONCLUSION</b>	81
A.	<b>RECOMMENDATIONS FOR FUTURE RESEARCH</b>	82
	<b>LIST OF REFERENCES</b>	83
	<b>INITIAL DISTRIBUTION LIST</b>	91

## LIST OF FIGURES

Figure 1.	The RPD Model (from Klein, 1997, p. 286).....	25
Figure 2.	OODA Loop (from Bryant, 2006, p. 184) .....	27
Figure 3.	CECA Loop (from Bryant, 2006, p. 192) .....	29
Figure 4.	The Three Dimensions (from JP 3-13, 2012, p. I-2).....	35

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## LIST OF TABLES

Table 1.	Routine Effects in the Process of Decision Making. (from Betsch, Haberstroh, & Höhle, 2002, p. 458).....	21
Table 2.	Naturalistic Decision Making/Recognition Primed Decision Making .....	77
Table 3.	Decision Making Under Risk.....	78
Table 4.	Observe-Orient-Decide-Act/Critique-Explore-Compare-Adapt (OODA/CECA).....	79

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## **LIST OF ACRONYMS AND ABBREVIATIONS**

C2	Command and Control
CECA	Critique, Explore, Compare, Adapt
CIA	Central Intelligence Agency
CNA	Computer Network Attack
CND	Computer Network Defense
CO	Commanding Officer
EBDM	Explanation Based Decision Making
EUT	Expected Utility Theory
EVT	Expected Value Theory
EW	Electronic Warfare
IO	Information Operations
MILDEC	Military Deception
MISO	Military Information Support Operations
NDM	Naturalistic Decision Making
OODA	Observe, Orient, Decide, Act
OPSEC	Operations Security
OSS	Office of Strategic Services
PE	Pseudo-Environment
POV	Point of View
PSYOP	Psychological Operations
RPD	Recognition Primed Decision
SC	Strategic Communications
T/T	Tactics and Techniques
XO	Executive Officer

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# **I. INTRODUCTION**

## **A. BACKGROUND**

Information Operations (IO) is a process that integrates all forms and mediums of communication in an attempt to influence the decision-making ability of a target decision maker or audience while protecting the ability of the United States to make decisions. Much of this process occurs as sub-processes or separate entities that can, when appropriate, stand by themselves. The predominant sub-processes are strategic communication, joint interagency coordination group, public affairs, civil-military operations, cyberspace operations (CO), information assurance, space operations, military information support operations (MISO), intelligence, military deception, operations security, special technical operations, joint electromagnetic spectrum operations, and key leader engagement (JP 3-13, 2012, p. ix).

The goal of the influence process is to have an adversary decision maker behave in a manner that is favorable to the United States, its allies and interests. IO has been known by the different names of the sub-processes and used throughout history to influence and persuade allies and adversaries alike. While not called information operations per se, the integration of many of these sub-processes, or information related capabilities, has been demonstrated throughout history as one of the keys to victory in battle.

The importance of influence and persuasion has been widely recognized in diplomatic and military writings (e.g., the writings of Aristotle and Sun Tzu). They have been studied and applied with varying degrees of success throughout history. Practitioners and theorists have focused on how the different tactics (e.g., valence framing, vivid appeal) and techniques (e.g., landscaping, emotional appeals) were successful. Few investigated why the tactics and techniques (T/T) were so successful and no background or information papers were located that discussed the results of the interaction of T/T on influence and persuasion. This thesis seeks to address this gap in the literature by examining the theories and models that underpin the T/T of IO. Most

importantly, this thesis will demonstrate how information plays a role in influencing decision making.

Understanding the role of information in decision making (i.e., the theories and models) provides IO with the proof of concept that using a type of T/T has the potential to successfully influence or persuade a targeted decision maker or audience to behave in a certain manner. Understanding how to manipulate the information to influence decision-making and behavior is the heart of IO. Without this knowledge, an IO campaign could not be tailored to influence a target decision maker or audience and any influence attempt may fail.

Furthermore, successfully influencing a targeted decision maker requires an understanding of the varied decision-making processes and models and an understanding of information as the stimulus that drives the decision-making process. Thus, manipulation of the information and how it is perceived will likely influence the perception, the decision, and subsequent behavior.

The complementary side to this is knowing how to protect against influence attempts by an adversary against us. This goes hand-in-hand with understanding how to utilize influence T/T, because an adversary may use similar types of T/T against the United States. Therefore, if tactics are known, an influence attempt that utilizes them will be easier to detect and thwart. This ensures that the United States has the best information available to continue to make the best possible decisions in any given situation.

## **B. PURPOSE**

Using the lens of the relevant theories and models, this thesis will identify and examine how information affects the decision-making process to influence a targeted decision maker or audience. Additionally, this thesis will discuss some of the techniques and tactics of influence that can potentially affect decision makers.

### **1. Primary Research Questions**

Possessing an understanding of the relevant models and theories of decision-making and how information affects the decision-making process could lead to better use

of IO against adversaries and potential adversaries. The primary research question of this thesis is: What is information's role in influencing decision-making?

## **2. Secondary Research Questions**

Prior to answering the primary research question, several preliminary questions will be answered. The preliminary questions are:

- What are the most relevant elements of decision-making theories and models that apply to IO?
- How does information affect these theories and models?

## **C. SCOPE**

This thesis will encompass three main areas with several sub-sections within each main area. The first area will be a discussion of the relevant elements of some of the theories and models. The relevant theories examined are:

- Expected Value Theory (EVT)/Expected Utility Theory (EUT)
- Economic Human/Rational Man
- Naturalistic Decision Making (NDM)
- Routine Decision Making
- Decision Making Under Risk.

EVT and EUT are theories that seek to find the option that has the most value or utility from the point of view (POV) of the decision maker. Economic man and rational human theories have identified certain characteristics of an ideal decision maker. NDM is a theory that discusses how experts reach a decision. Routine decision making theory explores the decision making process of and related to habitual situations. Decision making under risk is a theory revealing the decision making process when considering possible threat situations.

The relevant models discussed are:

- Recognition Primed Decision Making (RPD)
- Observe-Orient-Decide-Act Loop (OODA)/Critique-Explore-Compare-Adapt Loop (CECA)
- Information Operations (IO)

RPD, utilizing NDM as a foundation, models how experts make decisions. OODA illustrates how a decision maker can use information in a given situation to make a

decision. CECA builds on and expands OODA to encompass more information from the situation and environment surrounding the situation. IO demonstrates the integrated strategy for manipulating information to influence the behavior of an adversary decision maker or audience.

The second area considered in this thesis is a description of the information environment for influence, the mental picture and examples of influence techniques that have the potential to influence a decision maker. The information environment consists of three dimensions, physical, cognitive, and informational, that must be considered when assessing the impact of information on a specific decision. The decision maker inescapably incorporates information from these three dimensions when constructing a mental image of the operational environment (i.e., develops situational awareness.) Influence techniques provide a mechanism for altering this situational awareness to the advantage of an opposing commander. Finally, a description and analysis of how information works within the models and theories to influence the decision making process that support IO will be included in the third area. This section will demonstrate how information influences the decision making process, and is critical to any attempt to influence that process.

#### **D. ORGANIZATION OF THE THESIS**

The remainder of this thesis is organized as follows. Chapter II explores and describes some of the relevant theories and models of decision making. The theories are:

- EVT/EUT
- Economic Human/Rational Man
- NDM
- Routine Decision Making
- Decision Making Under Risk.

The models are:

- RPD
- OODA/CECA
- IO

Chapter III examines and identifies the elements of the decision-making process. This chapter also explores the information environment, the development of the mental picture, and provides examples of influence techniques.

Chapter IV describes and explores the information flow through two theories and two models. The theories are

- NDM
- Decision Making Under Risk

The models are

- RPD
- OODA/CECA

The analysis explores the possible characteristics of the theories and models, proposes techniques and tactics that could be used to influence the characteristics, and the sub-processes of IO that could be used in the influence attempt.

Chapter V provides a conclusion to this research. Information, influence and decision making will be discussed. Areas of research in the future are identified.

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## II. DECISION MAKING: THEORIES AND MODELS

One theme that emerges from this research is that no single process will explain all kinds of decisions.

—Arthur B. Markman and Douglas L. Medin<sup>1</sup>

Exactly how a human decision maker arrives at a decision is largely a mystery that will not be solved in the foreseeable future. However, the last century of theory and research has “uncovered substantial and systematic regularities in how people make decisions and has led to the formulation of general psychological principles that characterize decision-making behaviors” (Leboeuf & Shafir, 2005, p. 243). These principles are applicable for decisions of very large magnitude, like ones involving the risk of lives, and very small orders of magnitude, such as what to eat for lunch. While a century of study has produced many ideas, eleven theories and models are recognized as having built upon each other to explain decision-making (Simon, 1956; Lichtenstein & Slovic, 1971; Tversky & Kahneman, 1986; Persky, 1995; Hollnagel, 2007; Edwards, 2009). The theories and models are: expected utility and expected value, the economic human and rational man, naturalistic decision making, decision making under risk, routine decision making, explanation based decision making, recognition primed decision making model, the Observe-Orient-Decide-Act loop and the Critique-Explore-Compare-Adapt Loop. While these theories and models represent the broad areas in decision making research, they do not drill down to the lowest level to explain what an individual leader or decision making entity thinks or will do. At the most basic level, a theory needs to note the systematic regularities which best describe the decision making process irrespective of nationality, race, gender or point of view. Further, even though these models and theories are important and provide the necessary underpinnings for Information Operations (IO), none work without information. Information is the ignition and fuel that drives all the theories and models.

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<sup>1</sup> Arthur Markman and Douglas Medin, “Decision-making”, in *Stevens’ Handbook of Experimental Psychology Third Edition*, ed. Douglas Medin and Hal Pashler (New York; John Wiley & Sons, Inc., 2002), 429.

## **A. THEORIES**

### **1. Expected Utility and Expected Value Theory**

#### ***a. Expected Value Theory***

Expected Value Theory (EVT) was originally designed for economics. EVT states: “The expected value of a bet is found by multiplying the value of each possible outcome by its probability of occurrence and summing these products across all possible outcomes” (Edwards, 2009, p. 11). Psychologists recognized they could utilize EVT in explaining the choices people make and how decision making works. A decision maker that uses EVT is constrained by the monetary value of an object or decision. This prevents the decision maker from including information in the decision process that could result in a better decision being made (e.g., the cost of a computer is higher than another but it is more compatible with legacy systems than the other computer that executes the same function but costs less and is not as compatible with legacy systems). This constraint was acknowledged by economists and the theory was changed to include the utility of an object or decision. This resulted in the Expected Utility Theory (EUT).

#### ***b. Expected Utility Theory***

EUT states, “...the overall utility of an option is the sum of the weighted utilities of the attributes” (Markman & Medin, 2002, p. 416). This means a decision maker can consider more than the expected monetary value or gain of an object or decision; such as national pride or an object to which a decision maker has an emotional attachment. This also means a decision maker could decide a short term loss is worth the expected long-term gain (Edwards, 2009). In other words, from the point of view (POV) of the decision maker the knowledge and understanding that the short-term loss could be overcome by the long-term gain and be of greater utility entices the decision maker to absorb the short-term loss. However, utility is not defined in this theory and it is left to the decision maker to define what is of importance to the person or the organization (e.g., the sentimental value of a picture, a ring, or the rights and freedoms granted by law). The lack of definition gives EUT a wider range of applicability than EVT. This makes EUT better

suited to a military decision maker because they can determine the utility of an object, decision or event and make a better decision.

## **2. Economic Human and Rational Man**

The next two theories, economic human and rational man, shift the focus from the utility of the decision to the decision maker. The theories try to describe and capture how a person makes a decision in order to predict what decision may be reached in the future. The first theory classifies the decision maker as the economic human (Homo Economicus) (Persky, 1995; Edwards, 2009, Hollnagel, 2007). To qualify as Homo Economicus, a decision maker has to be

- completely informed
- infinitely sensitive and
- rational (Edwards, 2009; Hollnagel, 2007).

Being completely informed means the decision maker has all relevant and necessary information to know what the alternatives are and what their outcomes could be. Possessing infinite sensitivity means the decision maker can identify the differences between the alternatives and make a decision based on those differences. And being rational means, "...that alternatives can be put into a weak ordering and that choices are made so as to maximize something" (Hollnagel, 2007, p. 3). As with EVT/EUT, psychology adopted and adapted these theories producing the theory of rational man. Despite adapting the theories to be psychologically friendly, the theories were still too narrow in scope (e.g., Simon, 1956; Lichtenstein & Slovic, 1971; Tversky & Kahneman, 1986; Slovic, 1995; LeBoeuf & Shafir, 2005). The theories failed to account for limitations such as time, memory capacity, fatigue, and the biases or preferences of a decision maker. In considering the three qualifications for rational man, a decision maker fails to be completely informed because the decision maker cannot fully consider all options or alternatives available; it is just not possible (Leboeuf & Shafir, 2005). Second, the decision maker could discriminate between most of the options but the vast amount of permutations that could be available for the options prevent a decision maker from

possessing infinite sensitivity. And finally, rationality fails because of the biases and preferences of the decision maker (Leboeuf & Shafir, 2005; Lippmann, 1922).

Fatigue, as noted above, is just one of many ways to indicate the limited cognitive ability of the decision makers. The brain can only process so much information before shutting down or finding some way to reduce the cognitive workload (i.e., the use of a heuristic). Thus, decision makers make decisions in a bounded reality. A decision maker only has certain amount of time, energy, cognitive power or memory capacity to use. These are examples of many constraints (e.g., time, biases, and preferences) that are ignored by the models. One way that a decision maker deals with such constraints is by finding a solution that is satisficing. Satisficing is the 80% solution. The decision maker is searching for the “optimal” solution but will be satisfied with a solution once it passes some point only the decision maker knows or deems appropriate. Thus, a solution is “good enough” (Evans, Over, & Manktelow, 2008; Hollnagel, 2007; Simon, 1956).

It is not possible to extensively investigate all options, but a decision maker can use the time they have, their own cognitive ability and that of their support group (e.g., aides or cabinet members) to reach a decision. Most, if not all, of the time this is done with the use of heuristics. Heuristics are “...simplification strategies which repress awareness of uncertainty and create a simplified view of the information” (Williams, 2007, p. 45). Heuristics can be thought of as rules of thumb. They can make large amounts of information easier to understand and manage, and can shorten the amount of time needed to reach an answer. Research has shown that people rely on heuristics because they are fast and frugal. “For the real environment is altogether too big, too complex, and too fleeting for direct acquaintance. We are not equipped to deal with so much subtlety, so much variety, so many permutations and combinations” (Lippmann, 1922, p. 11). Use of heuristics reduces the cognitive stress load and could allow a decision maker to think about the different options, the differences between the options and which option is the best. Thus, a decision is reached under the imposed limitations (e.g., time, cognitive ability, bias) (Williams, 2007; Lippmann, 1922).

Rational man is the ideal; and most decision makers violate the three criteria above. They do not fit the ideal and are not, therefore, “rational”.

### **3. Naturalistic Decision Making**

Much of the research prior to 1989 was focused on finding the best option or making the optimal choice based on all available options without regard to the real world or context of the situation (i.e., EVT/EUT, and Economic Human/Rational Man). Researchers knew the flaws inherent in classical decision making theory but had a hard time breaking the paradigm to reach theories and models that would explain decisions (e.g., routine, non-routine or novel) in the real world (Klein & Salas, 2001). Naturalistic decision making (NDM) presented a new paradigm designed to encompass and address the flaws and inadequacies of previous models and theories by describing what decision makers do to make decisions (Klein & Salas, 2001; Klein, 1997). Caroline Zsombok introduced NDM as

...how experienced people, working as individuals or groups in dynamic, uncertain, and often fast paced environments, identify and assess their situation, make decisions and take actions whose consequences are meaningful to them and to the larger organization in which they operate. (Zsombok, 1997, p. 5)

NDM is how an expert makes a decision and/or gives advice in the real world (i.e., under time pressure and with ambiguous/incomplete information) (Zsombok, 1997; Markman & Medin, 2002). The phrase “give advice” is used because the expert may not be the final decision maker and may have the role of aiding in the process of decision making as in being the Chief of Naval Operations who advises the President on military matters unique to the Navy. Attempting to use classical decision making processes (e.g., EVT/EUT) under the constraints of the real world produces unsatisfactory decisions. Decisions that benefit from using classical decision processes are those that do not have a time constraint (i.e., constraint is relative to the situation years/months versus minutes/hours), the identified problem does not change, and/or the different stakeholders are involved in the process (i.e., if the identified problem is building a new office park then the contractors, building owner, and interested businesses all have a say or are informed of what is happening) (Klein, 1997). But NDM is not designed for such problems; it is designed for real world settings.

NDM, in considering the process used by experts and laymen in making decisions, takes into account the context or nature of the situation in which the decision is being made, the prior experience of the decision maker, and any relevant restraints or constraints. For this thesis an expert is an individual who has extensive experience in a subject or in decision making. A layman is an individual who has a small amount of conversational knowledge on a subject.

Thus, models of naturalistic decision making attempt to address how people can make decisions in situations where the conditions are changing over time, where information is ambiguous, and where the plausibility of potential goals and courses of action is shifting over time. (Zsombok, Beach and Klein, 1992, p.18)

Experts are better at making decisions than laymen because their experiences capacitated the development of a knowledge structure or schema. Utilizing his or her knowledge structure the expert can very quickly “see” cues and indicators that provide information about what is happening, or generate specific questions to have those at the scene give him or her the most comprehensive picture possible. This is an advantage as long as the expert has correctly identified the situation, otherwise what s/he “sees” will not inform the picture any better than what is seen or reported. If the problem has been correctly identified the expert will gather all the relevant information that s/he has access to and generate options to solve the problem. Many times the solution is one of the first, if not the first, option generated. If the expert is only slightly familiar or completely unfamiliar with the situation, s/he will fall back on classical decision making process, as a layman would, but s/he would move through the process faster due to their experience at making decisions (Klein, 1997; Markman & Medin, 2002). The expert would utilize their knowledge structure to identify the information they need to make a decision. If time does not permit or limits information gathering, then an expert can make a plausible guess about that information (Markman & Medin, 2002). This results in the most comprehensive mental model available for the decision maker to reach a decision. A layman could reach the same decision, using the same process but the time necessary to do so would be longer regardless of the problem or situation.

A large part of reaching a decision is how an expert or layman approaches the problem. A layman may not have an approach at all or a very limited one due to being inexperienced. An expert could have very definitive one or many approaches depending on how familiar they are with the problem (i.e., a familiar problem has a definitive structure while an unfamiliar one has a general, multipurpose structure). These approaches tell experts and layman what information is needed to make the best decision possible. But, as has been shown, expert approaches are better constructed and can be moved through faster than a layman's approach.

NDM is considered to be a useful theory because application of the theory supports practical solutions in the everyday world (Klein & Salas, 2001). Use of the theory enables decision makers (e.g., expert or layman) to design decision process models allowing better decisions. One such model is the Recognition Primed Decision Making (RPD) model (the first model in the model section).

#### **4. Decision Making under Risk**

What is risk? How do you define or describe what qualifies as a risk or just something that is uncertain or ambiguous? The *Cambridge Handbook of Thinking and Reasoning* defines risk as: "when the probabilities of the outcomes are known (e.g., gambling or insurance)" and ambiguous as: "the precise likelihoods are not known and must be estimated by the decision maker" (LeBoeuf & Shafir, 2005, p. 244). The Cambridge definition delineates a risky decision from an ambiguous situation by the degree of information a decision maker has about that situation (i.e., does the decision maker have enough information to identify the situation as a risk?). EUT/EVT would define a risky situation as dependent upon the degree of probability of the outcome. However, neither the amount of information a decision maker has nor whether the exact probabilities of an outcome are known matters. The only thing that matters is the outcome and, more importantly, the magnitude of the outcome, positive or negative (Williams, 2007). Therefore, a risky decision is dependent upon the magnitude of the impact the risk could have on the situation (i.e., the degree to which a possible outcome can adversely impact the mission, ship, equipment, or crew). Determining risk is close to

EUT/EVT because a decision maker has to consider and weigh the possibilities in order to act on or mitigate them. This should start with the decision makers recognizing their approach to risk as either being risk seeking or risk adverse. They, or their aides, should also know how they perceive risk and what their propensity is for taking risk. This information can help the decision makers protect themselves from influence attempts and knowledge of an adversaries risk perception and propensity could open avenues of influence.

Williams says, “An important feature of any decision is the degree of uncertainty associated with future outcomes” (Williams, 2007, p. 43). Given that risk is dependent upon unknown future outcomes, people make risky decisions every day and humans have multiplied and prospered based on these risk decisions (e.g., where to live, who to marry, etc.). The decisions made had to balance risk versus reward because risk is a constant in the process (Williams, 2007; Keil, Wallace, Turk, Dixon-Randall, & Nulden, 2000). The decision may be something small in magnitude such as opening the hatch without looking through the porthole. This is a low magnitude risk because if someone is there they will be bumped by the hatch and will probably not be significantly injured (if at all) and the ability of the ship to execute the mission(s) assigned should be unaffected. Also, the sailor opening the hatch will not be significantly delayed in their duties by having to wait for the passageway to clear before reopening the hatch and continuing on with what they were doing. An example of a high magnitude risk is carrying a heavy box containing a high value piece of equipment up or down a ladder without the help of a second sailor. It is high risk because the sailor might not be strong enough to handle it and fall down the ladder breaking bones, damaging the ladder and/or the item in the box may break and the ship would not be able to repair a necessary piece of equipment (e.g., a gyroscope) preventing it from getting underway. The risks in both of these examples were to personnel and ship. The magnitude of the outcome is the difference between the high and low risk decisions based on the effect it will have on the ability of the ship or organization to complete the mission(s) assigned.

The success or failure of the decision making process depends on our perceptions, attitudes and actions towards risk (i.e., how we see it). This is more formally known as



risk perception. Risk perception is defined as "...a decision maker's assessment of the risk inherent in a situation" (Sitkin & Pablo, 1992, p.12; Keil et al, 2000). People usually see risk as a negative aspect of a situation due to what could be lost. But a risk could be good or bad depending on the risk perception of a decision maker and how that risk is presented (i.e., how it is framed). Such framing is termed valence framing. Valence is defined as: "The attractiveness of an object or activity to a person" (Edwards, 2009, p. 10). While investigating valence framing, researchers have found that losing something (e.g., money or time) elicits a stronger pain reaction than the positive reaction to finding or being given something (Pratkanis, 2007). Basically, humans do not like to lose anything (e.g., time, money, life) and that loss hurts (Williams, 2007; Markman & Medin, 2002). This is why the majority of situations view risk as or have it presented as bad. Humans have a stronger reaction to a negative risk frame than a positive risk frame (Markman & Medin, 2002). Despite risk being viewed as bad, deciding to act on a risky decision could have a large magnitude positive consequence such as starting a small computing company that becomes a multi-billion dollar firm (e.g., Apple and Microsoft). The perception of that risk (i.e., the positive or negative valence frame) could nudge the decision one way or the other (Williams, 2007; Keil et al, 2000).

The decision maker, and his or her aides/cabinet, should also understand the propensity of the decision maker for risk. Risk propensity is the concept that a decision maker will have consistent tendencies towards risky behavior (i.e., whether they will take or avoid behavior that could be risky) (Kogan & Wallach, 1964; Harnett & Cummings, 1980; Sitkin & Pablo, 1992; Keil et al, 2000, p. 146). As with risk perception, risk propensity should be known in order to be protected from adversaries and the adversary decision maker's propensity should be known or discovered to influence them.

Two more behaviors that are subsets of risk propensity are risk seeking and risk aversion. Risk seeking is defined as holding the preference to choose the more risky option than the certain option while risk aversion is choosing the certainty option over the risky one (LeBoeuf & Sharif, 2005). These behaviors validate a decision maker's consistent tendencies towards risk. Thus, an analysis of a decision maker's previous

decisions in risky situations, if known, will expose their risk propensity. The same analysis could also indicate the decision maker's risk perception (Keil et al, 2000).

Risk perception and propensity are vulnerable to the influence of valence framing (Williams, 2007; Keil et al, 2000).

The general finding is that in the positive frame, people demonstrate a bias toward risk-averse behavior choosing the certain option over the risky option, and in the negative frame, a bias toward risk-seeking behavior choosing the risky option over the certain option. (Williams, 2007, p. 46; LeBoeuf & Shafir, 2005; Keil et al, 2000)

The frame people view the risk in is the frame the risk is presented in because most people do not think about the problem or risk situation in another way or from another angle (LeBoeuf & Shafir, 2005; Keil et al, 2000). Therefore, the valence frame may manipulate how the risk itself is seen whether it is an attribute of a choice or object (i.e., the performance benefits of a new computer operating system), or a behavior (i.e., what the decision maker could gain or lose). Regardless of the positive or negative valence of the risk decision, if the decision maker is constrained (e.g., lack of time or information), the decision may be made on the basis of the decision maker's use of known heuristics.

Researchers investigating risk decision making have identified four common heuristics used in making risky decisions: (1) availability, (2) representativeness, (3) anchor and adjustment, and (4) overconfidence (Williams, 2007). Availability and representativeness are drawn from NDM because the decision maker has a template or uses feature matching for the risk situation. Template matching refers to a situation that has been seen before and contains the knowledge that taking certain actions will alleviate the situation or accomplish the mission. Feature matching addresses aspects of the new situation that are similar to past situations, which can lead to a solution being found. Availability is how fast information is retrieved from memory about that type of situation or something similar to it (i.e., template or feature matching). The scale of the event (i.e., how much press it got) or how familiar the decision maker is with the situation will determine how quickly it is retrieved from memory (Williams, 2007). Availability also becomes a source of bias because if the past event was small in scale, retrieval from memory will take longer (if at all) and will be less available. Representativeness is how

the decision maker believes that situation A goes with category B (i.e., feature matching). Thus, if the decision maker sees a dark sheen on the water by the ship, recalls from memory what an oil leak looks like, compares these two sets of information and decides that it is or isn't an oil leak and takes further action from there.

The last two heuristics, anchor and adjustment and overconfidence, are examples of RPD. Like NDM, these heuristics start with template or feature matching and use information to build or adjust the mental model or picture.

Anchor and adjustment involves applying new information to a situation the decision maker is already aware of (i.e., template matching). The situation is known, new information comes in and decisions are made based on the new situation (Williams, 2007). The final heuristic, overconfidence, is self-explanatory. Overconfidence has a relationship with risk perception and risk propensity. If a decision maker's perception of risk in a situation is low, the decision maker may not perceive information that a situation is riskier than originally thought (i.e., the information disconfirms the decision maker's mental model) and will, therefore, take more risky actions (Williams, 2007; Keil et al, 2000). This could lead a decision maker to believe s/he has made the correct decision and then use this "correct" decision to increase their self-efficacy in making risky decision, which may change or reinforce their risk propensity toward risk seeking.

## **5. Routine Decision Making**

Most decisions that are made in a given day are routine. Whether they have been learned over a lifetime (e.g., eating breakfast) or a choice made in the last few months (e.g., running every morning), they are decisions that are small in magnitude and done with little cognitive effort. Betsch and colleagues defined routine as: "An option that comes to mind as a solution when the decision maker recognizes a particular decision problem (combination of goal and context conditions)" (Betsch, Haberstroh, & Höhle, 2002, p. 456). Thus, a routine is something a decision maker does not really think about and expects at some regular time interval (e.g., reporting for muster every day at 0730). A routine could become habit. A habit is simply a type of routine, like eating breakfast,

something done on a regular basis over an extended period of time (Betsch, Haberstroh, & Höhle, 2002).

Routine, as defined, is not a heuristic. The heuristics described above are used to solve a problem or find a solution to a newly confronted situation (as in RPD and NDM). Routines are known situations that already have template solutions and answers. They were encountered so frequently by the decision maker that the template is readily retrieved in short order (i.e., the memory is easily found). Thus, a routine is similar in appearance to a heuristic but its essence is very different.

Routine can hinder or help a decision maker. Unfortunately routine often leads to complacency. Decision makers become complacent when they overly rely on heuristics or automated processes such as relying on GPS for navigation. They lose situational awareness, believing the computer will alert them to trouble or the heuristic is satisfying enough to ensure safety and completion of the task. For example, the USS GREENEVILLE, SSN 772, was conducting a routine emergency surfacing maneuver and surfaced under a Japanese fishing trawler, the EHIME MARU, sinking the vessel and taking the lives of nine Japanese fishermen (Shattuck & Miller, 2006). The maneuver was conducted under time pressure (i.e., a limitation) and the crew took shortcuts and assumed the Commanding Officer (CO) (i.e., the decision maker) knew all the relevant information. Their sensors and computers displayed the information that the EHIME MARU was closing but the crew overrode that information because the CO stated he understood all the information (Shattuck & Miller, 2006). Thus, the crew decided to trust the CO more than the computer and denied the CO the necessary information to have a full picture of the situation (i.e., the crew acknowledged the information but it contradicted the routine of safely surfacing and knowing the CO had previously been correct after making such statements, see routine effect seven below) (Betsch, Haberstroh, & Höhle, 2002). The CO failed to seek information that would completely inform his picture because he was confident he had not seen any surface vessels and very familiar with the maneuver. They executed the maneuver with tragic results.

The crew was very familiar with emergency surfacing and knew what to do and what to expect. But it was routine to trust the CO when he said he had an understanding

of the information. The CO and crew lost or ignored information necessary for their situational awareness. The maneuver was routine until they surfaced under another ship.

Routine impacts decisions and decision making; researchers have found several models that predict parts of the routine decision making process but they have yet to find one single model that encompasses all aspects of routine decision-making. Further, researchers have identified several of the effects routine has on the process of decision making. For ease of impact identification the process has been broken down into four phases (Betsch, Haberstroh, & Höhle, 2002). Different researchers have identified these phases as common to most if not all decision making processes and used various nomenclatures to distinguish them. They are, in the most general terms, (1) start, (2) pre-selection, (3) selection, and (4) post-selection (Betsch, Haberstroh, & Höhle, 2002; Zsombok, Beach & Klein, 1992; Hey, Lotito, & Maffioletti, 2010; Bordley, 2001).

The start phase is the beginning of the process when the decision maker is presented with a new situation that requires attention. The pre-selection phase is an information gathering phase. The information may come from aides, experts, subordinates, or from the decision maker's own memory of past events that are similar to the current. The selection phase is the point at which the decision maker has or thinks s/he has enough information about the situation to form a solution and decides upon the solution. The post-selection phase is the action/behavior phase where the solution is executed (Betsch, Haberstroh, & Höhle, 2002; Zsombok, Beach & Klein, 1992; Hey, Lotito, & Maffioletti, 2010; Bordley, 2001). Researchers have identified ten routine effects on decision making. They are:

- Identification of selection problem causes routine activation from memory.
- Recognition of selection problem can directly invoke selection of routine behavior.
- Routine strength matters: the higher the frequency of prior behavior repetition, the higher the likelihood of immediate selection of the routine behavior.
- Depth of information search decreases with increasing routine strength.
- Elaborateness of search strategies decreases with increasing routine strength.

- In similar decision making situations, the tendency towards confirmatory information search increases with increasing routine strength.
- The impact of encoded information that contradicts routine choice decreases with increasing routine strength under time pressure, but also in unconstrained situations.
- The likelihood of routine choice in a situation that suggests deviation from the routine is moderated by context factors:
  - time pressure provokes routine maintenance;
  - perceived novelty of the situation provokes routine deviation.
- Routines can influence behavior independent from intentions.
- Intention-behavior relation is moderated by routine strength (Betsch, Haberstroh, & Höhle, 2002, p. 458).

Table 1 summarizes the relationships between phase, effect and researcher (Betsch, Haberstroh, & Höhle, 2002). These effects apply to any routine decision making process. Understanding the potential effects of routines on decision-making, a decision maker can use them or mitigate them when making a decision.

Phase	Process	Routine Effect	Reference
Start	Identification of selection problem, options and criteria.	<ol style="list-style-type: none"> <li>1. Identification of selection problem causes routine activation from memory.</li> <li>2. Recognition of selection problem can directly invoke selection of routine behavior.</li> <li>3. Routine strength matters: the higher the frequency of prior behavior repetition, the higher the likelihood of immediate selection of the routine behavior.</li> </ol>	<p>Aarts &amp; Dijksterhuis (2000) Klein (1989)</p> <p>Oulette &amp; Wood (1998) Ronis et al. (1989)</p> <p>Oulette &amp; Wood (1998) Ronis et al. (1989)</p>
Pre-Selection	Information search, editing process.	<ol style="list-style-type: none"> <li>4. Depth of information search decreases with increasing routine strength.</li> <li>5. Elaborateness of search strategies decreases with increasing routine strength.</li> <li>6. In similar decision making situations, the tendency towards confirmatory information search increases with increasing routine strength.</li> </ol>	<p>Aarts, Verplanken, &amp; van Knippenberg (1997)</p> <p>Aarts, Verplanken, &amp; van Knippenberg (1997)</p> <p>Betsch et al. (2001, exp. 2)</p>
Selection	Evaluation of criteria, application of a decision rule.	<ol style="list-style-type: none"> <li>7. The impact of encoded information that contradicts routine choice decreases with increasing routine strength under time pressure, but also in unconstrained situations.</li> <li>8. The likelihood of routine choice in a situation that suggests deviation from the routine is moderated by context factors: <ol style="list-style-type: none"> <li>(a) time pressure provokes routine maintenance;</li> <li>(b) perceived novelty of the situation provokes routine deviation.</li> </ol> </li> </ol>	<p>Baumann, Brown, Fontana, &amp; Cameron (1993) Betsch et al. (1999) Betsch et al. (2001, exp. 1)</p> <p>Betsch et al. (1998)</p>
Post-Selection	Behavior implementation	<ol style="list-style-type: none"> <li>9. Routines can influence behavior independent from intentions.</li> <li>10. Intention-behavior relation is moderated by routine strength.</li> </ol>	<p>Bagozzi (1981) Beck &amp; Ajzen (1991) Bentler &amp; Speckart (1979) Fredricks &amp; Dossett (1983) Landis, Triandis, &amp; Adamopoulos (1978)</p> <p>Mittal (1988) Montano &amp; Taplin (1991) Verplanken, Aarts, van Knippenberg &amp; Moonen (1998)</p>

Table 1. Routine Effects in the Process of Decision Making. (from Betsch, Haberstroh, & Höhle, 2002, p. 458)

## **6. Explanation Based Decision Making**

The decisions that are made have to be explained at some point. Whether it is to a senior officer or to the stockholders, the decision to act must be based on evidence or information of some sort. Of particular importance are large magnitude decisions that affect a person's life such as decisions in law, politics, medicine and diplomacy (Hastie & Pennington, 2000). Hastie and Pennington defined explanation as: "a mental representation of the situation relevant to the decision, with an emphasis on causally significant events, conditions and relationships." (Hastie & Pennington, 2000, p. 213; Lippmann, 1922) Therefore, explanation based decision making (EBDM) is assumed to make the decision based solely on the available information in a passionless manner and decision makers create a version of that information as the explanation of the final decision (Hastie & Pennington, 2000; Lippmann, 1922). It must be looked in the context of what the situation is and who the actors are. In this way, the individual decision maker can accurately evaluate the evidence with each individual decision maker developing a different, yet similar mental representation of the evidence (Hastie & Pennington, 2000).

EBDM is more applicable to non-routine or novel decisions in which the decision makers have little or no experience or knowledge. It is these situations that demand evaluation and synthesis of the information received or evidence presented (Hastie & Pennington, 2000; Zsombok, Beach & Klein, 1992). This is especially true for novel or non-routine decisions such as first time car buying, being a juror in a criminal case or when deciding to merge two large companies. The major feature of EBDM is evaluating the information in a passionless manner and making a choice on information alone (e.g., gas mileage, safety rating, evidence, motivation, cost benefit analysis). This singular reliance on information is what separates EBDM from all other forms of decision-making models and theories, and makes it very applicable to military decision makers.

### **B. MODELS**

#### **1. Recognition Primed Decision Making Model**

Where the NDM covers all decision maker levels of experience, RPD is designed to model how the expert makes decisions in his/her area of expertise. RPD has three



critical assertions at the core of the model. The first and most critical is, as Gary Klein states in his book *Naturalistic Decision Making*: “The most critical assertion of the RPD model is that people can use experience to generate a plausible option as the first one they consider” (Klein, 1997, p. 288). This means that a decision maker or an advisor who has dealt with a particular situation will be able to assess the situation faster and more readily produce or recommend a course of action that has the most potential of solving the problem, versus someone who utilizes a classical decision-making strategy (i.e., EVT/EUT) (Zsombok & Klein, 1997; Markman & Medin, 2002). The plausible option generated first is also the strongest option. A decision maker may generate other options but they are not of the same high quality as the first one (Klein, 1997).<sup>2</sup> The second assertion is that a decision maker who has significant experience should not be adversely affected by time pressure because s/he uses pattern matching. The decision maker takes the information about the scene and compares it to a previously encountered situation (i.e., the decision maker retrieves a memory). This allows the decision maker to understand what could reasonably be accomplished, use the directed telescope to find important information, look for cues that indicate whether the plan is working, and make decisions for follow on actions (Klein, 1989).

The third assertion of the RPD model is an experienced decision maker can select a course of action and not have to compare other courses of action. A decision maker, building off the first two assertions, chooses a course of action without comparing it to others because his/her experience enables one to identify and understand the scene, and go with an action that may succeed in solving the problem (Klein, 1997).<sup>3</sup>

A decision maker uses pattern or feature matching (i.e., use of mental models) and story building to diagnose what s/he is viewing or being told about because there is an amount of uncertainty in what is happening. “Diagnosis is the attempt to link the observed events to causal factors; by establishing such a linkage the decision maker would obtain an explanation for the events” (Klein, 1997, p. 290). Diagnosing an event is

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<sup>2</sup> For a full discussion of this assertion see Klein, Wolf, Militello, & Zsombok, 1995 and Calderwood, Klein, & Crandell, 1988.

<sup>3</sup> Full discussions and empirical data for the last two assertions can be found in Calderwood, Klein, & Crandell, 1988 and Klein, 1989 and Kaempf, Wolf, Thordsen, & Klein, 1992.

very important because it better informs the decision maker as to the nature and context of a situation, which greatly influences the selection of an action. Feature matching, explained above, helps to identify a situation through categorization, which means once the situation is known it can be dealt with in a similar fashion as other situations in the same category. Story building involves mental simulation of events in order to find a causal explanation of events. The benefit of using this is being able to simulate what could happen when using a certain course of action and/or walk back in time from the first observation of the event in order to simulate and determine what the prior causal factors could have been.

RPD is focused on how experts make decisions. While the differences between experts and layman are many, the RPD model shows several areas that laymen could learn and improve their decision-making capabilities. Experts are creating a more accurate mental picture from the beginning, learning what information is needed to build a better mental picture, better identification of the most appropriate option, and when or where to apply that option (Lipshitz & Shaul, 1997). These areas are improved through classroom training and real world experience. Further, RPD reinforces and displays the theory of satisficing because the limits of the real world make it impossible to execute a thorough and time consuming deliberation about the options (Klein, 1989). But laymen and experts are required to make decisions in real world situations that move quickly in several directions at once without all the relevant information (Zsombok, 1997). The confluence of uncertainty, of rapidly changing context, and constraint of time may result in bad and wrong decisions; worse yet, no decision will be made and the situation will continue to deteriorate to the point of destruction. Figure 1 shows the RPD Model.

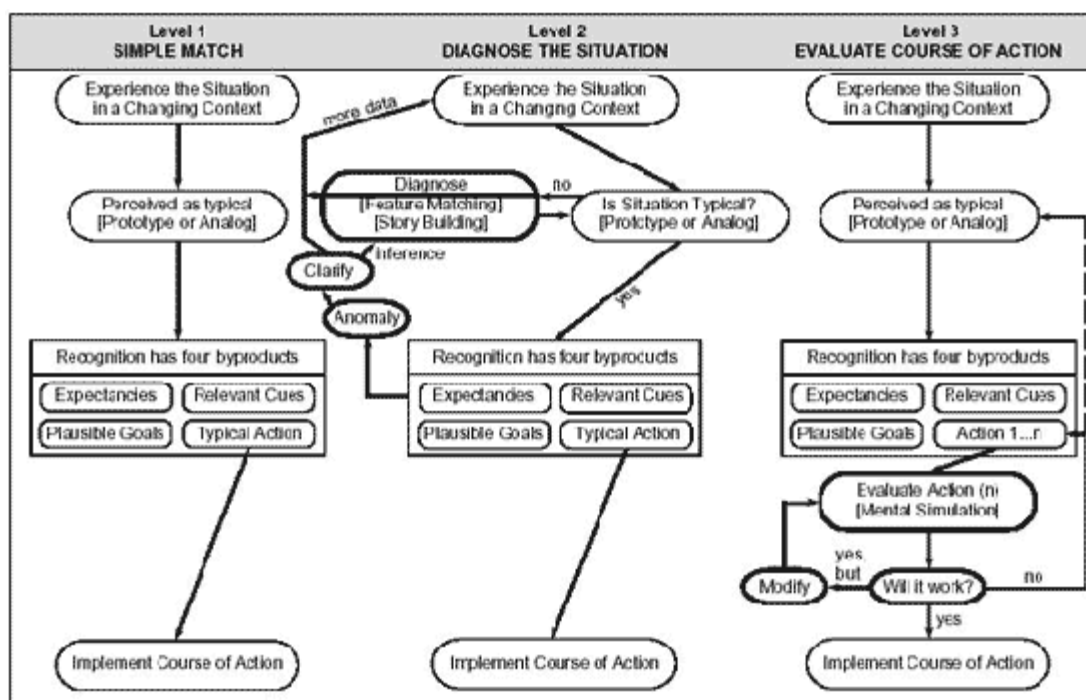


Figure 1. The RPD Model (from Klein, 1997, p. 286)

## 2. Observe-Orient-Decide-Act Loop and the Critique-Explore-Compare-Adapt Loop

### a. Observe-Orient-Decide-Act Loop

The observe, orient, decide, act (OODA) loop has been a staple in military decision making since it was designed and published in the late 1960s by Colonel John Boyd, USAF (Ret.). The OODA Loop was developed “...to understand the success of American F-86 Sabre pilots versus opponents flying the technologically superior MiG-15” (Bryant, 2006, p. 184). Through his work, Colonel Boyd discovered that American fighter pilots gained a distinct advantage in air-to-air engagements by ascertaining what the enemy was doing, how it could hurt him, and acting to counter or pre-empt the enemy tactic. Pilots used NDM/RPD after becoming experts on MiG tactics (e.g., the pilots studied gun camera footage and discussed the previous engagement movement by movement) and recognized the information while engaged in combat and applied that information to the stored mental model in order to reach the solution that enabled them to shoot down the MiGs they fought (McIntosh, 2011). Thus, the faster the pilots worked

through this process (i.e., the OODA loop), the faster they could gain the advantage by getting inside the MiG pilot's OODA loop and shoot them down (Bryant, 2006). Being able to get inside an adversaries loop creates a mismatch between what is actually occurring in the environment and what is being modeled in their head (i.e., the development of their mental model). This causes confusion, forcing the adversary to lengthen their loop. This lengthening could paralyze their decision-making process or cause them to make a decision based off of incomplete information. Thus, an adversary cannot reach a decision or the decision they make benefits us, which potentially leads to their defeat (Fadok, 1997). Figure 2 illustrates the OODA Loop.

The OODA loop took the world by storm but that was half a century ago. It is a great design for a basic decision process at the tactical or small unit level but has not been updated to include the last fifty years of cognitive development research, such as goal directed cognition and mental models (Bryant, 2006). Goal directed cognition states that people are interested in and about the world and society they live in, and mental models are "situational representations that maps elements of an external system (a problem, situation, or event) and the interrelationships among those elements onto a conceptual structure" (Bryant, 2006, p. 188). Updating OODA to include these and other developments would allow OODA to apply to more complex situations and events beyond the small unit level, to encompass task group and battle group maneuvers. However, there are cultural and practical reasons why the military will not retire OODA in favor of a more inclusive theory and model (McIntosh, 2011). OODA is well established in the military and it is a relatively simple theory that can be understood and used by the most junior decision maker. Additionally, OODA is intentionally vague and while this vagueness does prevent it from describing more complex problems, it provides latitude in defining what is included in each stage and how to act or react to that stage (e.g., a commander could insert if-then statements in their battle orders). The latitude allows a commander and subordinates to craft unique definitions for themselves and a particular situation. The vagueness has also made the OODA loop a practical tool for anyone seeking to gain an advantage over adversaries in their field (e.g., military, business, or sports) (McIntosh, 2011).

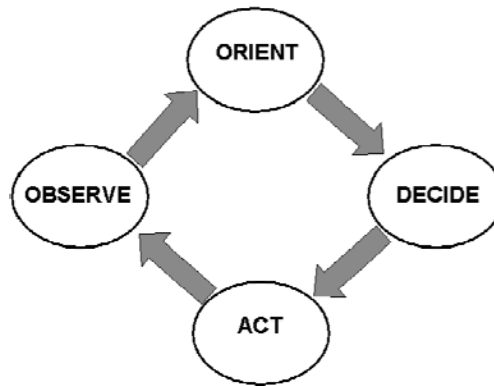


Figure 2. OODA Loop (from Bryant, 2006, p. 184)

***b. Critique-Explore-Compare-Adapt Loop***

Building and expanding on the OODA loop framework is the Critique-Explore-Compare-Adapt Loop (CECA). CECA was developed by David J. Bryant of Defense Research and Development, Canada. It is designed to model command and control (C2) processes in alignment with the last 50 years of cognitive psychological advancement that views it in a more ecological context. That is, more attention is given to how the mind adapts to the interaction between the mind and environment, and the internal representations of the world (Bryant, 2003; Wilson, 2002).

CECA, unlike OODA, is not really circular. It has four main areas (CECA) and five sub-areas: conceptual model, situational model, information gathering, filtering, and directed telescope (Bryant, 2003 & 2006; Van Creveld, 1985). It can be considered a loop because the process through the sub-areas and main areas does go in order and is continuous, which can be seen as circular. However, some parts happen simultaneously once an operation begins. The process starts with the sub-area conceptual model (i.e., the mental model). “The conceptual model will be a representation of how the operation is intended to proceed” (Bryant, 2006, p. 193). This will be the common picture of the operation that informs everyone involved how the operation is supposed to go and it should guide their actions and what information they should seek (Bryant, 2003). Next, the situational model is developed. The situational model, essentially, takes a snap shot of the operation at any given moment in time to evaluate how the operation is proceeding in relation to the mental model in order to validate assumptions in the plan and look for

indications that the assumptions were wrong (Bryant, 2006). Such indications are anything that would invalidate the conceptual model (e.g., the adversary did not believe a deception act and kept their forces in place). This starts the first main area of critique. The critique asks questions to see if the conceptual model can be invalidated (Bryant, 2006). The next phase is explore, which will answer the questions by using the directed telescope. The directed telescope looks for specific information amongst the vast amount of data pouring in from the operational space (e.g., like NDM/RPD in which an expert knows what information to look for or, when they have little experience with it, what information is or could be missing) (Bryant, 2006; Van Creveld, 1985). The information that is found is filtered to ensure only relevant information is passed back up. The filtered information is then applied to updating the situational model. The following phase is compare. This phase compares the updated situational model to the conceptual model and sees if there are any incongruities (Bryant, 2006). If there are any, and there almost always are, then the final phase of adapt occurs. In the adapt phase the decision maker must choose between three choices:

- to ignore the inconsistencies if they are deemed of low consequence (i.e., inconsistencies with the conceptual model that have little practical impact)
- to alter the means by which the goals of the operation are to be achieved, or
- to alter the goals themselves if the most basic assumptions of the conceptual model are invalidated (Bryant, 2006, p. 195).

Figure 3 depicts the CECA Loop.

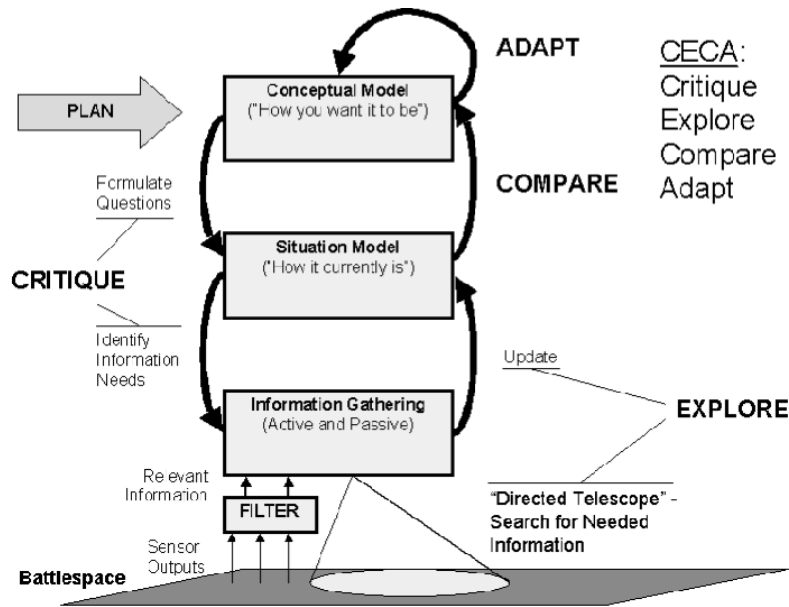


Figure 3. CECA Loop (from Bryant, 2006, p. 192)

The CECA loop is not as intuitive the OODA loop (Bryant, 2006). It is not intended to be. CECA is a model of an integrated command and control (C2) process for an operation that can be understood by the participants. As such, it is a tool for the decision maker to use while training with his or her staff or aides and during task group level operations (i.e., not small unit level). It is focused on the military but the sub-areas and main areas can be easily applied to a business venture or planned investment.

CECA, OODA and all the previous models and theories have one main thing in common. They all fail to emphasize that without the information, none of the models and theories work. The models and theories assume a person will be rational and act on the information. Underlying everything is the context and point of view or worldview. The rational clause is dependent on where you are and what that culture considers rational. Rational to a US citizen may be an insult to a citizen of another country. Therefore, information is the ignition and fuel for the models and theories.

### **3. Information Operations**

Information Operations involve processes used to influence an adversary to act in a way that benefits friendly force objectives. As the US military has come to better understand the role of information in conducting military operations the definition of information has evolved. The current definition captures the broad nature of information operations as an amalgam of disciplines associated with information and influence:

The integrated employment, during military operations, of information-related capabilities in concert with other lines of operation to influence, disrupt, corrupt, or usurp the decision-making of adversaries and potential adversaries while protecting our own. (JP 3-13, 2012, p. GL-3)

This notes the necessary tie-in to on-going military operations, the many and varied ways influence can be spread while protecting friendly capabilities to execute IO campaigns and the decision making process. Information, or the lack thereof, can cause adversary or potential adversary decision makers to make a decision and commit to an action that leads to an end result that benefits, or at least does not harm, friendly operations. Therefore, a decision is made with some form of information. Without any information a decision would not need to be made because the world would be in perfect balance, no change would be perceived or forced on someone.

How a decision maker and the general population view the world is based on information and how they see, or want to see, the world (i.e., their POV). Thus, they form an opinion about the world (or whatever they are considering). Take the example used by Walter Lippmann in his book *Public Opinion*:

There is a small island in the ocean where in 1914 a few Englishmen, Frenchmen and Germans lived. No cable [i.e., no telegraph or telephones] reaches the island, and the British mail steamer comes but once in sixty days. In September it had not yet come, and the islanders were still talking about the latest newspaper which told about the approaching trial of Madame Caillaux for the shooting of Gaston Calmette. It was, therefore, with more than usual eagerness that the whole colony assembled at the quay on a day in mid-September to hear from the captain what the verdict had been. They learned that for over six weeks now those of them who were English and those of them who were French had been fighting in behalf of the sanctity of treaties against those of them who were German. For six strange weeks they had acted as if they were friends, when in fact they were enemies. (Lippmann, 1922, p. 3)



The island population had only one way to get information, the mail steamer, and did not know that World War I had begun. The inhabitants had been making decisions based on old information and with the certainty that the world was as it had been, as they had seen it and in their opinion, for the past four or five decades, peaceful (Lippmann, 1922). This is a simple example of why information is important and how it influences a person's view of the world, that is, their POV or pseudo-environment (PE). It is from this POV or PE, which has been influenced by information, that decision makers make decisions (e.g., when using EVT/EUT, who decides the value or utility of an object? The person viewing it. Or when using NDM/RPD/OODA it is how the expert, based on experience, views a situation different from a person who has little or no knowledge of the situation) (Lippmann, 1922; Edwards, 2009; Zsombok, 1997; Markman & Medin, 2002; Bryant, 2006). But how does a person begin to understand the opinion of another? And how does that understanding help to influence a decision maker?

Understanding another person's opinion begins with understanding how that opinion was reached. That opinion was born from "the triangular relationship between the scene of action, the human picture of that scene, and the human response to that picture working itself out upon the scene of action" (Lippmann, 1922, p. 11). Simply put, an opinion is the resultant conflation of information (e.g., an alarm saying the ship is in shallow water), the interpretation of that information (e.g., the alarm tolerances are set too high), the decision makers' reaction to the information (e.g., the ship is in safe water) and how the view of the situation is changed by the decision makers reaction to the information (e.g., ignore the alarm because the decision maker is not concerned by it). Thus, the captain holds the opinion the ship is fine where it is and does not need to make a course change.

Knowing how a decision maker forms an opinion will create avenues of exploitation to influence, corrupt, disrupt and usurp the information that drives the decision making process. For example, many consider the most successful IO campaign in modern history to be Operation Bodyguard. Operation Bodyguard was the deception campaign designed to keep Hitler guessing as to the actual time and location of the pending Allied invasion of northern France (Breuer, 1993).

The Allies had agreed to open a second front in Europe to alleviate pressure on the Soviet Union from Nazi Germany (first in 1942, then postponed to 1943 and finally in 1944). The second front would open up in France after a cross channel invasion (Breuer, 1993). The invasion site was kept a secret even from Stalin until the very last moment (due to the fear Stalin might use that information to negotiate a peace with Hitler). The Allies knew that Hitler, and Hitler alone, made all military and political decisions. They knew they could use his biases, beliefs and myopic view of things (and those he surrounded himself with) to keep the invasion sites a secret until Allied soldiers hit the beach.

The Allies used many tactics and techniques to influence and keep the Fuehrer and the Third Reich's multiple information and intelligence gathering arms guessing. Tactics and techniques such as having reconnaissance craft fly more missions over an area, the Pas de Calais, than over others. The Nazis picked up on this and reported it back to Hitler. The extra over flights simply reinforced (i.e., influenced) his opinion that the Allies would invade France via the Pas de Calais region, as had been done throughout history due the short distance between England and France at that point (about 20 miles). The Allies also identified German spies in England and either turned them into double agents or executed them (i.e., disrupt and corrupt the information gather and reporting process). These double agents, the so called First String Violins, fed the Nazis intelligence and information that confirmed what the Allies were already doing or had plans to do (i.e., usurping the information reaching Hitler). The information they sent was enough to convince the Nazi intelligence services that the received information was accurate and actionable (e.g., the First Strings would send an urgent communication saying the Allied High Command had just placed General Patton in charge of a newly formed army and the next day newspapers in England would run the same information. Thus, their credibility was established, maintained and increased.). They influenced Hitler and his inner circle into believing and focusing on the Pas de Calais region as the invasion site. This became evident when Hitler refused to release the Panzer divisions stationed around Pas de Calais to repel the landings at Normandy (i.e., behavior that favored the Allies).

The IO campaign was a resounding success. It succeeded because the Allies knew how Hitler reached his opinions and decisions, and what they were. They used that information and developed a plan (using many if not all the models and theories known at that time) that integrated IO into the ongoing operations influencing Hitler and the German High Command into believing the invasion would come through the Pas de Calais region of France.

### **C. CONCLUSION**

No one model or theory will explain or predict what or how a decision maker chooses an option. Research and theory has identified some of the systematic regularities within decision-making (Leboeuf & Shafir, 2005). However, it is still difficult to describe and predict the choices that need to be made and to make decisions. Many of the proposed decision theories and models were developed in laboratory settings and failed to incorporate the real world or context of a situation. Only within the last couple of decades has the context of a situation been considered. NDM/RPD, and OODA/CECA all incorporate information received from the context of a situation or the environment in which the situation is playing out.

The context of a situation and the environment are important as they provide the decision maker with information about the situation that could help the decision maker to have a full understanding or picture of the situation, thereby helping to establish an accurate PE and mental model. Decisions are not made in a vacuum. A decision maker has to understand the environment in which the decision is to be made. For example, a Sailor might overhear the CO ordering the Navigator to break out charts of Africa and believe the ship will soon be headed there. The Sailor tells his shipmates to prepare for a deployment to Africa. But the ship is not deploying to Africa. The CO is preparing for officer training and the sailor took his order out of context. Thus, the picture (i.e., the information) the Sailor developed was wrong. Similarly, information received from the environment or PE impacts a decision in many ways such as by confirming what was expected (deploying to Africa), only partially confirming what was expected (deploying but not to Africa) or by providing disconfirming information (not moving off the pier). Thus, the information received from the context or environment enhances the decision

maker's understanding (e.g., confirming or contradicting) of the situation and a decision can be reached on how to act.

The act caused by manipulating the information, information environment and the decision making process to execute a decision(s) that favor the United States and her Allies is the end state of an IO campaign. How is the information manipulated? What are the tactics? What avenues can be used for influence in an IO campaign? Which information needs to be provided (and decisions influenced) and at what level (i.e., national, state, or local)? These are some of the questions to consider when planning an IO campaign. This thesis will provide some of the answers in the next section, Information Manipulation.

### III. INFLUENCE-MANIPULATING THE INFORMATION

The models and theories discussed in the last section depict the process of decision-making, what a decision may require to complete the process and in what order the process needs to be completed. If the process of making the decision is understood, ways to manipulate the information used by the decision-maker and the process can be planned for and executed. Information can be manipulated in a manner favorable to transmitting a message that would influence a target. Influence can be used in the physical, cognitive and informational dimensions of the information environment (JP 3-13, 2012). This thesis proposes that the same dimensions that are characteristic of the information environment also characterize the information within that environment. All three dimensions have different features that can be used to exploit or defend the information. Figure 4 depicts the information environment.

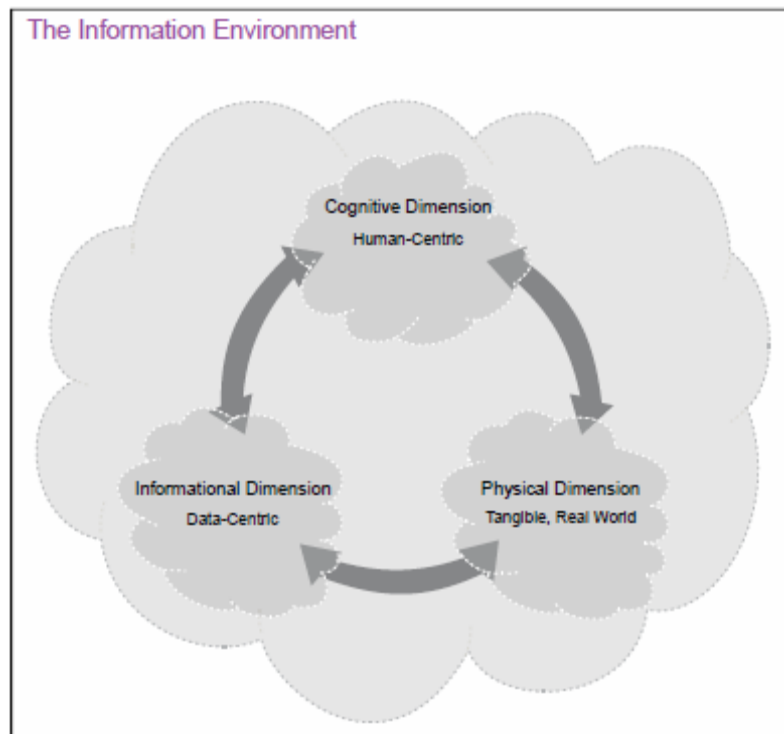


Figure 4. The Three Dimensions (from JP 3-13, 2012, p. I-2)

## **A. INFORMATION ENVIRONMENT**

The three dimensions are completely interactive with each other but have been separated into the three dimensions because the preponderance of evidence places a piece of equipment, an action, or information more in one area than another (as shown in Figure 4). In brief, the physical dimension moves the information; the informational dimension gathers the data and interacts with the physical to display the data; and finally, the cognitive dimension interprets the data gathered in the informational dimension and displayed in the physical dimension. This is a continuous cycle feeding the demand for information.

### **1. Physical Dimension**

The physical dimension of information encompasses two broad areas, functional and economic. The functional area moves and displays the information and, as such, is the conduit for information (i.e., voice communications, email, reports). It displays the information in the form of symbols (i.e., letters and words), indicators (i.e., a symbol representing a known friendly contact or an unknown, assumed hostile contact on an Aegis display), and pictures or video. The display represents the information being inputted and received from the informational and cognitive dimensions. This display provides a decision maker with a manageable representation of the scene of action, that is, the information the decision maker is seeking.

The economic area is the price tag and business aspect of intelligence (e.g., the company who builds the satellites, the cellular phones, and cameras). The economic area is the most identifiable area when a decision maker is speaking about intelligence and information. This area has all tangible equipment, parts and infrastructure normally associated with communications (e.g., transmission and reception), command and control, wires, and the mediums they are placed in (e.g., sea, air, land, and space) (JP 3-13, 2012). Thus, it is the easiest to quantify and measure. It provides the necessary tools to use effectively employ sensors (i.e., NDM/RPD, and OODA/CECA) to find the wanted information or just to observe an adversary and see what indicators, if any, they give off (e.g., massing troops and supplies on a border) (Bryant, 2006; Van Creveld,

1985). The economic area uses the original economic version of EVT/EUT to place a price tag on all the tools, parts, infrastructure, maintenance, and everything else associated with it (Edwards, 2009; Evans, Over, & Manktelow, 2008). The system or equipment that is best suited for a task and has the best price is bought and used.

The physical dimension connects the informational with the cognitive dimension by displaying, moving, and sharing the information (i.e., the functional area) (JP 3-13, 2012). It is in the physical dimension that information goes from specific to general. As information is passed between users the decision maker at each level receives the information, cognitively filters it and passes the information along. This results in the physical truncation and generalization of information. Thus, a top decision maker receives intelligence that is distilled into the most important information based on the context of the situation (a new situation or an answer to an exploratory question).

## **2. Cognitive Dimension**

The cognitive dimension involves thinking and processing the information received from the physical and informational dimensions. As such, the cognitive dimension may be considered the most important dimension, for both friendly and adversary decision makers (JP 3-13, 2012, p. I-3). A decision maker will take in the information from the physical and informational dimensions, simplify it through the use of heuristics, making the amount of information more manageable, and step through the decision-making process to reach a decision (e.g., EUT/EVT, NDM/RPD, or OODA/CECA) (Edwards, 2009; Persky, 1995; Edwards, 2009; Hollnagel, 2007; Zsombok, Beach & Klein, 1992; Bryant, 2006; Van Creveld, 1985). However, as the information progresses through this process of interpretation, analysis, comparison, and amalgamation, the decision maker changes it. This change, known as information filtering, is the result of the decision makers' point of view (POV) or pseudo-environment (PE), his or her biases and beliefs, and how that information was displayed to the decision maker (Evans, Over, & Manktelow, 2008; Hollnagel, 2007; Simon, 1956; Williams, 2007; Lippmann, 1922). Additionally, information filtering applies for decision

makers at all levels of the decision making process from the highest national or strategic decision maker to the local or tactical decision maker.

The cognitive dimension also contains information that may influence the decision maker. For example, a nation's population thinks, perceives, visualizes, and, like the decision maker, makes decisions about an issue (JP 3-13, 2012; Lippmann, 1922; Lewin, 1936; Festinger, 1957; Milgram, 1974; Pratkanis & Aronson, 2001; Pratkanis, 2007). These and many other factors are contained within the cognitive dimension. Although not included in the 2012 version of JP 3-13, the 2006 version offered additional factors such as leadership, morale, unit cohesion, emotion, state of mind, level of training, experience, situational awareness, as well as public opinion, perceptions, media, public information, and rumors that also influence this dimension (JP 3-13, 2006, p. I-2).

### **3. Informational Dimension**

The informational dimension is where "information is collected, processed, stored, disseminated, displayed, and protected" (JP 3-13, 2012, p. I-3). As such, this dimension shares many characteristics with the physical dimension. The tools (e.g., computers, satellites, or email) from the physical dimension are utilized in the informational dimension. However, information is a separate entity in the informational dimension. The informational dimension contains the content and flow of information. The computers can, based on their programming, make decisions, analyze the data, and recommend courses of action to the decision maker. The informational dimension must be protected because if friendly forces or nations cannot send or receive information, then a decision will not be reached or the process will never begin. The three dimensions illustrate how information is processed, used and potentially altered.

While information can be manipulated in all three dimensions, the dimension of ultimate interest is the cognitive dimension. The cognitive dimension controls decision-making by amalgamating the information received from the physical and informational dimensions. The five areas within the cognitive dimension that may potentially be influenced:



- how the decision-maker sees the situation
- how that picture is developed
- public opinion about the situation
- what is found in the picture; and
- psychological life space.

Each potential way of influencing the cognitive dimension will be discussed below.

## **B. THE DECISION MAKING PICTURE**

### **1. How the World is Seen**

One way to influence the decision maker is to identify the scene of action and manipulate what the decision maker sees, wants to see or is told about (if not at the scene) (Lippmann, 1922; Zsombok & Klein, 1997; Zsombok, Beach, & Klein, 1992; Bryant, 2006). Lippmann stated: “whatever we believe to be a true picture, we treat it as if it were the environment itself” (Lippmann, 1922, p. 4). Therefore, the first information a decision maker receives plants a picture of what is happening or going to happen in his or her mind whether it is an accurate representation of the situation or the antipode of it (Lippmann, 1922; Zsombok & Klein, 1997; Zsombok, Beach, & Klein, 1992).

Like the POV/PE mentioned earlier, that first picture or mental model is the anchor used to start the decision process. This anchor is based on information that has been filtered through the experiences, biases and beliefs of the decision maker and the aides or experts that passed the information to the decision maker. Then the decision maker adjusts that picture based on new filtered information (Williams, 2007). Decision makers “believe absolutely...not what is, but what is supposed to be the fact” (Lippmann, 1922, p. 5; Hastie & Pennington, 2000). A decision maker holds to this picture because the information has been filtered through their biases and beliefs (i.e., they convince themselves it is true or accurate). Another decision maker may view it differently because the information has been filtered differently. Consequently, a decision maker may be blinded or give little weight to any information that is contradictory or not in line with the

picture they see in their heads (especially if they associate the picture with one of their routines, see routine effect seven on Table 1) (Betsch, Haberstroh, & Höhle, 2002).

It is this filtered view of the scene that serves as the basis for making a decision. The decision made has consequences in the real world and not in the PE or picture used to reach the decision.

In defense of friendly decision making, a decision maker should recognize how a picture develops and what s/he needs to do to control that picture in order to keep it accurate (i.e., keep it as influence free as possible), and prevent it from becoming too skewed from the actual scene. This is accomplished by understanding what and how the picture develops, and by recognizing that information is filtered through biases and beliefs. Then a decision maker can be aware of information that may be contradictory but important to how the decision maker wants the picture to be (e.g., accurate or skewed).

## **2. Mechanics of the Picture**

In order for a decision maker to understand picture development s/he must recognize the triangular relationship between the scene, the picture of the scene, and the reaction working out on the scene (Lippmann, 1922). Once known, the picture can be managed, changed, and influenced to maintain accuracy or present any picture a decision maker wishes. Every human being sees something and forms a picture to make it easier to manage. However, the picture changes due to their response to the scene based on filtered information and the consequences of their behavior towards the scene (Evans, Over, & Manktelow, 2008; Hollnagel, 2007; Simon, 1956; Williams, 2007; Zsombok, Beach & Klein, 1992; Bryant, 2006). A decision maker needs to understand this to control or mitigate the triangular relationship (i.e., censor the information). This enables the decision maker to respond to possible reactions from the population or other decision makers whose behavior is based on scant information and the belief, or the will to believe, that some action they disagree or disapprove of is happening.

The altered reality that decision makers and people can and will hold true results from the relationship between the scene, the human picture, the response to the scene, the casual fact, the will to believe and human imagination. Decisions are made on what

decision makers see in their heads, not on information they gathered themselves (Lippmann, 1922). This can exacerbate or temper a situation. This is eminently true in conflict (political or military) when both sides feel they are in the right and justified in defending themselves.

### **3. Public Opinion**

Public opinion encompasses different attributes depending on the level of interest (i.e., individual, group, local, or national).

The pictures inside the heads of these human beings, the pictures of themselves, of others, of their needs, purposes, and relationship, are their public opinion. Those pictures which are acted upon by groups of people, or by individual acting in the name of groups, are Public Opinion with capital letters. (Lippmann, 1922, p. 18)

This distinction is made because decision makers and people will hold different pictures based on what interest group they are acting on or looking at (i.e., their POV). This is important for political decision makers (or any decision maker that depends on popular support) who have to pander to the various voting blocs to be elected and re-elected. Politicians have to respond to individual and group needs on both a local and national level, so knowing what their opinions are is necessary. Knowledge of public opinion is also necessary for military leaders.

Military decision makers and leaders need to concern themselves with public opinion because rumors, innuendo and false information may destroy the morale of a unit. A Sailor does not vote for who should be the CO or XO, but if the CO and XO decide to enact a bad or unpopular policy, the Sailors will minimally comply with it and incessantly complain about it (i.e., their behavior will reflect their opinion that the policy is bad or unpopular). This will filter up to the CO and XO (i.e., inform them), at which point they will have to deal with the policy. “Public opinion deals with indirect, unseen, and puzzling facts, and there is nothing obvious about them” (Lippmann, 1922, p. 17). Again, knowing how public opinion is formed will help a decision maker, regardless of the level, manage and mitigate the rumors and bad information. This should help to keep

the Sailor's perception of the environment (PE) as accurate as possible. Thus, the picture of the situation that develops is also as accurate as possible.

The public forms a picture in their heads the same way a decision maker does. Knowledge of what is in or goes in the picture allows the decision maker to manage or mitigate the public opinion.

#### **4. In the Picture**

The decision maker develops a picture of the situation; however, the shape of that picture will be affected by the decision maker's perception of the environment. This is true for each individual decision maker viewing the picture as each PE is equally different. What, then, is the PE? Lippmann states the PE is "a hybrid compound of 'human nature' and 'conditions'" (Lippmann, 1922, p. 16). But Lippmann leaves it at that and lets the reader decide what human nature and conditions mean. Kurt Lewin picked up the discussion of the PE and tried to illuminate what he thought should be a part of it. He described a decision maker's PE as a psychological life space (Lewin, 1936). Then he considered what should go in this psychological life space. That is, what makes up the picture?

The psychological life space encompasses all information known to the decision maker, relevant or not. A decision maker's entire life up to that point goes into the design of the picture, into the PE. The vast majority of the information will be in the fuzzy, gray, indistinguishable background and margins of the picture, but it is still there. "One can represent a life space in a continuous progression and take into account all necessary dynamic facts, whether they are determined directly or indirectly" (Lewin, 1936, p. 21). This would include the previous training a decision maker has received like schooling or life experiences such as graduating college or passing a professional qualification board. Anything that has been cared about (i.e., people, places, things, ideas) will influence how the picture develops or is interpreted, even if it is just in the background. Thus, "one must consider the whole situation as the total of what has effect for the individual under consideration. What is real is what has effects" (Lewin, 1936, p. 19). The real information will be in the foreground of the picture. This can be new information about

the scene that changes the situation or a moment that imposes itself on the developing picture.

A moment during a lifetime is easily understood. Some moments are defining such as getting married or taking command of ship; others are not so definitive such as getting reprimanded by the captain. These moments can be quick and volatile, long and boring or any other combination, but they come and they go. All the while, a person has their life in the background. Information is combined to change the background slightly. A decision maker sees the moments as the object in focus, or in the foreground, of the mental picture being used or one that had been used (i.e., a memory or template). Thus, each situation informs the other and is intimately connected to it. The moment influenced the life space that had caused it (Lewin, 1936). These are interwoven with each other and help to define the picture that is seen. Interest must then turn to discovering the phenomena that interact to create an individuals' life space.

## **5. Facts of the Psychological Life Space**

At first glance a person would be tempted to answer this question by saying all known information, just as with the picture, form the facts of the psychological life space. However, all known information cannot be considered by an individual due to the sheer amount of data that would have to be considered every time a decision had to be made (even using heuristics) (Lewin, 1936). Further, a new situation with new information would force the entire decision making process to start over just so the new information could be weighed against or applied to the known information. Facts that get included are those that are real. But how can something be determined to be real? A fact is real when it affects a person at that moment. People are not affected by every action that happens around them. Therefore, facts may be quasi-physical, quasi-social, and/or quasi-conceptual. For example, an event happening 100 feet away from a person is not real to that person if they are unaffected by it. This is, as Lewin called it, a "quasi-physical fact" (Lewin, 1936, p. 24). The facts are called quasi-physical because the environment outside a decision makers head is physically there but the knowledge that it is there has to be recognized and acknowledged by that decision maker. Then it is filtered by the decision

maker and added to the picture of the current moment. Consequently, the same room can look completely different to different people (e.g., a Chief and the XO), even if they are in it at the same time. That same room can appear different for the Chief depending on his how he feels, his mood, or his goals (Lewin, 1936). The condition the Chief is in shifts the focus of his or her picture or brings to the foreground something that skews the accuracy of the picture. That could be hunger pangs, the knowledge of a task that has yet to be completed or some other bit of information that pushes itself into the spotlight of the scene. The Chief, with a skewed picture, may order (i.e., decide on how to behave) his Sailors to clean the room in order to have it meet the intended picture or template of cleanliness and organization.

Why does the Sailor comply with the Chief's orders? For people who work outside the military, why do they obey laws? The answer to both questions lies in the psychological life space of seeing themselves as a member of the military or as law-abiding citizens who believe that is how they should act (see source credibility below for a review of the granfalloon, social norm, or social modeling) (Lewin, 1936; Pratkanis, 2007; Goldstein & Cialdini, 2007). Again, the facts are in relation to the person and how that person is affected. People choose a social relationship, making it part of who they are and believing they should behave in a certain way because that is how they see a member of that group behaving. This belief in "normative group behavior may be more important than the legal or social definition of group membership" (Lewin, 1936, p. 25, Pratkanis, 2007; Goldstein & Cialdini, 2007). These chosen social relationships are called quasi-social facts and like the quasi-physical facts, will be retained in the psychological life space (Lewin, 1936).

This thought process is often true for anyone who views themselves as being part of a group. They identify with the group, adopt the values and views of that group, and begin to see the world through the filter of the group's influence and the group's structure (i.e., their social identity). The structure is plainly seen when people identify themselves as liberal, conservative, democrat or republican. Identifying yourself as such leads a person to view the world in that way and make decisions based on that group view or, at least, give more weight to the views that reflect the group's values and norms. These

facts form the quasi-conceptual facts of a person's psychological life space. Group association is usually tied to a person's profession or something s/he is passionate about. That means if s/he wants to progress in his or her career and move up the pay scale, s/he has to work within the structure of a job to gain experience, knowledge and recognition of abilities (Lewin, 1936). Therefore, "the individual concerned must adapt if he wants to attain certain goals" (Lewin, 1936, p. 26). The military is a good example because a person has to adjust and adapt to the military lifestyle; otherwise, they can be discharged for failing to adapt.

One can see how the various facts can skew a scene one way or another. But these facts are not as distinctly separate as one may think. The psychological life space is conflated with these facts. Some situations are easily placed in one of the three domains (quasi-physical, quasi-social, quasi-conceptual) but the vast majority cannot be. The domains help to filter and inform the picture that develops in the mind of a decision maker. Knowing this will help a decision maker ask the right questions to be the most informed or seek supporting and contradicting information in order to have the most accurate picture possible before making a decision.

The facts and information that reach the final decision maker are applied to the initial picture of the scene. What happens if that initial scene changes? How does the scene change and how is that change recognized? The scene can, as Lewin says, influence the picture in two ways.

One can roughly distinguish two cases in which the life space is influenced from the outside: (1) The influence can occur by way of perceptual process, usually leading to a change of the cognitive structure of the field with reference to the object in question. (2) The influence can be a gross somatic one. A stone may hit a person and cause injury or loss of consciousness. This stone need not necessarily appear in the perceptual field of the person. (Lewin, 1936, p. 27)

This means the scene on which a picture is based can change due to an internal cognitive choice based on perception or an outside force. Both are new information from the outside environment about the scene, but one is perceived and the other is, essentially,

forced. Understanding what goes into a decision and how multiple decisions interact could make it easier to reach a decision. This requires an understanding of:

- (a) how the world is viewed by himself and others
- (b) how the picture develops
- (c) how the development of that picture leads to public opinion
- (d) why a decision maker must concern themselves with public opinion at the level that affects him or her
- (e) what goes into a picture
- (f) the psychological facts that underlay everything.

Knowing all this helps the decision maker make a better decision utilizing the theories and models described earlier. Furthermore, this understanding gives the decision maker and his or her organization the ability to nimbly respond to changes in and challenges to the picture used to make decisions (e.g., the process of OODA/CECA). These changes and challenges could be the efforts and results of adversarial IO and strategic communication (SC) campaigns such as adversarial propaganda. A large part of propaganda is spreading rumors, half-truths and outright lies. During WWII the forerunner of the Central Intelligence Agency (CIA), the Office of Strategic Services (OSS), produced a guide or handbook on successful rumor building and spreading. It builds and capitalizes on many of the parts mentioned above [(a)–(f)].

## **C. INFLUENCE TECHNIQUES**

### **1. Rumors-A Corrosive Force**

A decision maker has to deal with rumors because of the effect it can have on the mission, military, populous and government. Rumors can affect people by “first, creating and increasing fear, anxiety, confusion, over-confidence, distrust and panic. Second, by forcing the release of enemy information and encouraging impotent enemy action.” (OSS, 1943) These effects directly affect (a)–(f) above

A rumor is a believable but unverifiable story with the following characteristics:

- it is easy to remember
- has a stereotypical plot that follows the traditions of the target group
- it is of interest to the target group; and
- exploits the emotions and sentiments of the target group (OSS, 1943).



Rumors create problems for a decision maker, forcing him or her to spend time and money on combating or debunking the rumors. That, in turn, means the decision maker is not devoting as much cognitive power to the conflict or war as s/he could be and gives an advantage to the adversary. A successful rumor will, therefore, have the ability to affect five of the dimensions of decision making: (a) how the world is viewed by himself and others, (b) how the picture develops, (c) how the development of that picture leads to public opinion, (e) what goes into a picture and (f) the psychological facts that underlay everything.

Tailoring a rumor ensures its ability to spread, exponentially affecting more people, and requiring more answers or expenditure of resources by the decision maker or government to refute the rumor. This requires the person crafting the rumor to have knowledge and intelligence on the target audience (JP 3-13, 2012; OSS, 1943). If the audience was the people of a nation, the intelligence necessary for crafting a rumor could be their traditions and folklore [(a)], willingness to support the decision maker [(c)], or level of privation they are willing to accept [(c) and (f)].

This information on the target audience helps to guide and tailor a rumor to increase its efficacy and alter the picture and scene the decision maker develops in their minds. During WWII “the creation of a successful propaganda rumor is more an accomplishment of art than of science” (OSS, 1943). Since that time many new theories, models and influence tactics such as valence framing, social norms, vivid appeals, and effort justification have been proposed and identified. Additionally, researchers have also made progress in identifying and verifying the building blocks of effective communication and influence.

## **2. The Techniques of Influence**

Aristotle in his book *Rhetoric* presents “three facets to effective communication: *ethos* (good character), *logos* (an effective message), and *pathos* (control of the emotions)” (Pratkanis, 2007, p. 18). Building on Aristotle the researchers added one more characteristic or technique, landscaping or pre-persuasion, and updated the meanings. Aristotle was aware of pre-persuasion but did not consider it a characteristic of effective

communication. The original three characteristics were updated to become: “create a relationship with the audience (source credibility), present the message in a convincing fashion, and use emotions to persuade” (Pratkanis, 2007, p. 19). Including pre-persuasion, these four base characteristics are the foundation for many tactics used in IO, SC, and advertising campaigns.

The techniques of influence can be used in each dimension of the information environment (cognitive, physical, and informational). They all deliver information to the decision maker in different ways and have different strengths and weaknesses with advantages and disadvantages. The techniques, tactics, dimensions of information, picture development and the decision maker’s response to them correspond to the cognitive response law of influence (Greenwald, 1968; Pratkanis & Aronson, 2001; & Pratkanis, 2007). The law states:

The successful persuasion tactic is one that directs and channels thoughts so that the target thinks in the manner agreeable to the communicator’s point of view; the successful tactic disrupts negative thoughts and promotes positive thoughts about the proposed course of action. (Pratkanis, 2007, pp. 19–20)

Thus, initial or new information changes the scene or picture in a way that convinces an adversarial decision maker to behave in a manner that is favorable to a friendly desired end state.

The four foundation blocks that form the techniques of influence are defined as the following. Landscaping or pre-persuasion (*atechnoi* to Aristotle) is creating or setting a scene such that the target decision maker or audience is more inclined to listen to the message and act in accordance with it. Source credibility (*ethos*) is: “the establishment of a social relationship that facilitates influence between the source and target of influence” (Pratkanis, 2007, p. 30). The effective message (*logos*) is one that induces the target decision maker or audience to focus on what the communicator wants them to. Emotional tactics (*pathos*) are those that use emotion as a vehicle to influence a decision maker and audience.

Tactics have been developed through the years to leverage the techniques of influence. These tactics can be used to influence a decision maker or target audience. Many of the tactics have been in use and known for many decades but few have been empirically tested. This lack of testing led researchers to speculate as to which tactics belonged to which foundational areas. Researchers recognized this problem and have since scientifically tested and classified over 100 tactics of influence (Pratkanis, 2007). Some of the tactics can work in more than one area but the preponderance of evidence places them in one area. The following are a brief review of a select few tactics, organized within each of the foundational blocks<sup>4</sup>.

**a.      *Landscaping***

Landscaping or pre-persuasion seeks to set the stage for persuasion. That could be anything from buying a bar of soap to moving forces to another area of the battlefield, weakening part of the front. Landscaping attempts to “control the cognitive (e.g., perceptions of issues, options, etc.) and social (e.g., the process of decision-making) structures used to reach your opinion or decision” (Pratkanis, 2007, p. 21). The following tactics can be readily viewed in product advertisements and political ads, but they can also be easily used during an IO campaign: (1) define and label an issue in a favorable manner, (2) valence framing, (3) control the flow of information, and (4) control the procedures for making a decision.

(1) Decision makers will view the same situation or picture differently based on how it is labeled, especially if the decision maker is not at the scene of action. Labeling an issue is pushing initial information out through a pre-selected filter. The information comes out already colored and viewed in a certain way based on how it is labeled. This directs a decision maker or target audience to think about that issue in the way the influence agent wants them to, which then leads to possible compliance with the influence attempt.

(2) Valence framing portrays an issue in a positive or negative light (Pratkanis, 2007). The classic demonstration of this is the Asian disease problem developed in 1981

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<sup>4</sup> For a full review of the tactics see *The Science of Social Influence* edited by Anthony Pratkanis.

by Amos Tversky and Daniel Kahneman (1981). For this demonstration, Tversky and Kahneman formed two groups of participants and asked them to imagine an outbreak of a disease during which it was estimated that 600 people will die. The first group was given two options: Program A will save 200 people while Program B gives a  $1/3$  probability that all 600 will be saved and a  $2/3$  probability no one will be saved. The second group was given two different program choices. Program C said 400 people would die while Program D gave a  $1/3$  probability that no one would die and a  $2/3$  probability that all 600 will die. Group one participants overwhelmingly (72%) chose Program A. Interestingly, 78% of group two chose to gamble on Program D (Tversky & Kahneman, 1981). Thus, the first group chose a certainty of saving 200 lives versus the probability of the same thing ( $1/3$  of 600 is 200) and group 2 chose to gamble on a  $2/3$  chance of death (a  $1/3$  chance of life) over a certainty of 400 killed (meaning 200 lives saved). Group one chose to save 200 lives and group 2 chose not to kill 400 lives, in essence saving the other 200. The information presented to both groups was exactly the same. The results for all choices are the same. The difference was how that information was presented. The filtering of initial information into a positive or negative light framed how the groups viewed the scene and informed their decisions (Tversky & Kahneman, 1981, Pratkanis, 2007).

(3) One of the oldest forms of influence available involves selecting what information is released or withheld. A decision maker would, ideally, have most or all of the relevant information before making a decision. But denying a decision maker all relevant information or hiding and/or minimizing the relevant facts in a deluge of irrelevant or unnecessary facts greatly hinders the decision making process. An example of this is the invasion of Normandy during WWII. After the landings had begun President Roosevelt made a broadcast to the American people (which the Nazi knew about almost immediately) stating “The Germans appear to expect landings elsewhere. Let them speculate. We are content to wait on events”-inferring a second invasion” (Breuer, 1993, p. 215). Thus, Hitler was denied the facts and presented with a falsehood of a second invasion.

(4) “Control of the procedures translates into control of the outcome” (Pratkanis, 2007, p. 28). There are many procedures for making a decision (e.g., EVT/EUT, NDM, and OODA). The process can be shaped by a variety of competing demands such as time, the type of decision (e.g., majority or unanimous), and what the decision is trying to accomplish (e.g., optimizing versus the 80% solution). The information is inputted into the process of choice. That process may only use or accept certain types or amounts of information. This means a decision maker will only have access to the information that has passed through the filter of the process and the decision will be based on that information, not necessarily on all the relevant information.

Landscaping sets the stage for the persuasion. The stage now belongs to the communicator who delivers the message. The next step for the communicator is to establish a social relationship with the audience. This relationship will be the conduit for the influence attempt.

#### ***b. Source Credibility***

Source credibility is an essential part of influence. The communicator has to be credible or the audience will, in most cases, tune them out. Researchers initially believed the communicator had to possess what the audience believed were good characteristics (i.e., good morals and good sense) (Pratkanis, 2007). But it was discovered that this was not necessarily true. They found “what is important for influence is the establishment of a social relationship that facilitates influence between the source and the target of the influence” (Pratkanis, 2007, p. 30). This means the communicator has to establish some sort of rapport with the audience such that they, the audience, believe the communicator to be credible source of information about the topic being discussed. Examples of tactics used to establish rapport are: (1) be a credible source, (2) grandfalloon tactic, (3) social norms, and (4) social modeling.

(1) Researchers have found there are many reasons for a communicator to be found persuasive. They have been roughly divided into two groups, hard and soft. A hard communicator has attributes such as being an expert (Hovland, Janis, & Kelley, 1953) or of high social status (Leftkowitz, Blake, & Mouton, 1955) while the soft communicator

has attributes like being attractive (Chaiken, 1979) or likeable (Cialdini, 2001) (Pratkanis, 2007). Based on these attributes, an audience would ascribe, from their POV, a certain amount of weight or buy-in to what the communicator is saying. The information presented should be relevant to the influence attempt to have the greatest impact on the audience. If the information being presented by the communicator is outside their recognized attributes, the influence attempt will have a smaller impact on the audience.

(2) A *granfalloon* is a social identity chosen by an individual that is usually meaningless (e.g., a Buckeye, a Freemason, a Democrat) (Pratkanis, 2007). This opens up two readily exploitable avenues for influence. The first one tells or guides the person's attitudes and beliefs, and the second is a source of self-esteem and social status (Lewin, 1936; Pratkanis, 2007; Goldstein & Cialdini, 2007). Information received is first filtered through the group values and ideals before being applied to the developing picture. Once the group values are applied, a course of action is chosen and compared to what the group believes is acceptable. This behavior, the social norm of the group, defines the decision maker as part of that group.

(3) Social norms are the rules that guide behavior and attitudes in a situation. Norms are broken into descriptive and injunctive (e.g., quasi-social facts); that is, what most people do and what should be done (Lewin, 1936; Pratkanis, 2007, Goldstein & Cialdini, 2007). Social norms are the filter that serves as a measuring stick or reference that a decision maker uses for making decisions or holding an attitude.

(4) Social modeling is acting in the same manner as the communicator. Often the communicator is paid for his/her endorsement of the behavior being modeled. A person of high status will be seen working in a soup kitchen or at a battered woman's shelter. Therefore, audience members may want to copy them because the communicator is a person they want to be like (Pratkanis, 2007; Bryan & Test, 1967). The information displayed is social modeling injunctive and provides an example of how to act if the audience believes the act is representative of their values.

The communicator has established source credibility. Now he must deliver the message to influence the audience. However, the message must be delivered effectively in order to be received positively.

*c. Effective Message*

The message is the heart of an influence attempt. Everything else is operating in support of the message. Without an effective message, anything else that has been or will be done is likely to be in vain. The message should focus the audience on what the communicator wants them to think (Pratkanis, 2007). Then the communicator can give reasons to do something or have the audience provide the good reasons why they should comply with the influence attempt. Some tactics that can be used are: (1) self-generated persuasion, (2) message fit, (3) vivid appeals, and (4) repetition of a message.

(1) Self-generated persuasion is one of the most effective forms of influence because it results in a steadfast change in attitude (Boninger, Brock, Cook, Gruder, & Romer, 1990; Miller & Wozniak, 2001; Watts, 1967; Pratkanis, 2007). The persistence of the attitude change is the result of the influence target being asked to come up with reasons for behaving in accordance with the influence. The audience takes the information, filters it through personal values and applies it to their picture, ensuring it is displayed in a positive and beneficial light. Thus, people convince themselves that the new behavior is best one for the reasons they developed.

(2) A second way to develop an effective message is to play to your audiences' biases. When the message from the influence agent draws on the belief system of the audience, the message is more likely to be received (Pratkanis, 2007). The belief system of the audience may be how they see themselves (e.g., the granfalloon, religious, social norm), a stereotype, a pre-existing belief, or a shared experience. An influence agent provides information that is similar to or reinforces a belief or experience. The audience links the information with the belief or experience being played on and gives that message more credibility than a similar message that does not link to a belief or experience.

(3) Vivid appeals are also ways to generate meaningful messages. Vivid appeals may be emotionally interesting and/or may agitate the audience either with the message or with the visual effect. In either case, the message relates to the present time or near future (Pratkanis, 2007). The communicator paints an image for the audience that conveys the information and the audience personalizes because they are seeing the picture in their minds. Additionally, the image they see may stay with them and help form their opinion about a product, plan or scene. The emotion hooks the audience, the image is injected and changed based on how an individual emotionally responds, and then placed in the foreground of the scene. This happens because the audience processes the information through their filters making the information, if well crafted, more believable.

(4) The final tactic is to repeat the message frequently. It has been demonstrated that the more a message is heard or seen, the more validity is given to it, even if it is a complete lie (Pratkanis, 2007; OSS, 1943). The information contained in the rumor or message will gain strength as more people receive and spread it. This happens because an individual will hear it from or has the rumor confirmed by a communicator they hold as credible. Therefore, the individual passes it on what he/she believes is credible fact. Thus, the rumor mutates from unconfirmed information to confirmed fact by multiple individuals, not actual confirmation of the facts (e.g., urban myths).

Self-generated persuasion, ensuring that the message fits the audience, vivid appeals, and repetition of a message are all tactics that can be used to deliver the message to the audience. The audience then has to consider the message. However, the communicator can continue to direct the audience through appeals to their emotions.

#### ***d. Emotional Tactics***

The message may be the heart of the influence attempt but emotion is the blood, hot or cold, that pumps through it. “Arouse an emotion and then offer the target a way of responding to that emotion that just happens to be the desired course of action” (Pratkanis, 2007, p. 50). For example, using fear, scare them, point to a person or object



and tell them by banishing that person or destroying that object they will relieve their fears.

Emotional appeals work because emotions are easy to create and offer many paths for influence to work in. Emotional people typically do not hear or see all the facts of a situation. They are occupied in dealing (i.e., reducing negative feelings or continuing positive ones) with that emotion and are more susceptible to agree to a course of action that deals with that emotion (Pratkanis, 2007). Four emotion tactic examples are considered here: (1) fear appeal, (2) guilt sells, (3) norm of reciprocity, and (4) effort justification.

(1) People do not like negative consequences (e.g., losing money). In developing an emotional message based in fear, a negative consequence is offered unless the preferred course of action is taken. Further, the audience needs to believe that the preferred course of action is obtainable (Leventhal, 1970; Maddux & Rogers, 1983; Pratkanis, 2007). Everyone has, at some point in their life, dealt with fear and has been given recommendations or information to conquer that fear. The information contained in a fear appeal has been framed in a very negative light from the POV of the audience and skews the scene that has developed in their heads. The communicator then provides more information on how to reverse or reduce that skew. If the audience believes they can accomplish the recommendation, they will try to. Thus, the audience conforms to the communicators influence attempt.

(2) As an emotional tactic, guilt prompts a person to act in the desired manner in order to reduce the guilty feeling or to conform to a preferred image of self. A person who feels guilty is more likely to comply with an influence attempt if the behavior sought reduces the guilt. The behavior does not need to be associated with the action that caused the guilt; it just has to satisfy, from the view of the guilty party, the level of restitution or repair of self-image to the point before the guilty action occurred (Pratkanis, 2007). The feeling of guilt creates a cognitive dissonance that is painful (Festinger, 1957) and that pain forces the object of guilt into focus in the picture. Now the individual is focused on the object and will be seeking information that provides a path to move that object out of

focus. The information provided has to be relevant to the individual with the guilt in order to be successful.

(3) Norm of reciprocity refers to social obligation. Someone does a favor for you and it is expected that you return the favor at some point (Pratkanis, 2007). People are more likely to be influenced to comply when they feel indebted to someone or something. Norm of reciprocity is the opposite side of guilt. The information pushes an object to the foreground of the picture but it is not painful. It carries a sense of gratitude that an action was done on their behalf and they now feel compelled to do something that, from the POV of the individual, satisfies the debt to society. They will search for information and be more open to influence that enables them to meet this self-imposed social obligation.

(4) The final emotional tactic discussed, effort justification, means that the harder something is to attain, the more it is worth at the end relative to the amount of time and energy expended to attain it. Forcing someone to jump through hoops or complete a large amount of required work leads that person to justify why they worked so hard (Pratkanis, 2007). Information that another person achieved the same or similar result creates cognitive dissonance and forces the person to value that result higher than the person who did not expend the same amount of time or energy (Festinger, 1957).

### **3. Overcoming Resistance-Omega Strategies**

If all audiences behaved or thought as a communicator wanted them to, then there would be no reason to influence them. Most times the resistance is not a person saying “no” but a person who is ambivalent about a decision because enjoying the benefits of one choice means losing the benefits of the alternate choice (Pratkanis, 2007). Decision-making processes and models are used because a decision maker is ambivalent in the sense that they do not know which choice is best for them or their organization. The ambivalence opens two possible routes, alpha and omega, for influence and persuasion to overcome or reduce the ambivalence. “One set of persuasion strategies attempts to increase the attractive features of the alternative; the second set attempts to decrease the negative features of the alternative” (Knowles & Riner, 2007, p. 83). These are very different strategies and researchers have found that when employed, a majority of the

time emphasizing the attractive features is often the first influence attempt used. Attempts at reducing the negative features were tried second and less often. Thus, they have been dubbed the alpha and omega approaches respectively. The approaches are widely recognized in psychology and have been verified by neuroscientists (Knowles & Riner, 2007)<sup>5</sup>. Either strategy used should overcome resistance but how that is accomplished and at what cost differs greatly between the alpha and omega approaches. Much of the research in overcoming resistance has been focused on the alpha approaches. Alpha strategies simply overwhelm resistance without reducing it (Perloff, 2003; Knowles & Riner, 2007). However, omega strategies work to reduce the decision makers' reluctance (Knowles & Riner, 2007). Reducing reluctance is a relatively new approach to influence. Recognition of the value of the omega approaches has increased and so has the research into it. Omega strategies represent the focus of this thesis.

Omega strategies have proven that they reduce reluctance and ambivalence, and are relatively inexpensive resource-wise to implement. Reducing the reluctance and ambivalence makes “the decision less conflicted and more satisfying” (Knowles & Riner, 2007, p. 106). They are inexpensive because incentives and bonuses do not need to be added in and an influence agent does not have to spend the time establishing extensive relationships with the target audience members. Time and money are saved which is good for the bottom line or a decision maker can make more decisions in a faster time, which can equal an advantage over an adversary.

Research into resistance has identified three areas of resistance: reactance, skepticism, and inertia (Knowles & Riner, 2007). Reactance is a defense used when an individual is threatened by an influence or change attempt. Skepticism focuses on what is being asked (i.e., an individual does not believe the message). Inertia is a desire to keep the status quo; no change for any reason. Each of these types of resistance has strategies that can be used to overcome them. As with influence, the type of resistance (i.e.,

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<sup>5</sup> The neurology of this process is outside the scope of this thesis, for a review of the science see DC Fowles 1988 article *Psychophysiology and psychopathology: A Motivational Approach*, in the journal *Psychophysiology* or J.A. Grays' 1994 article *Framework for a taxonomy of psychiatric disorders* in the book *Emotions: Essays on emotion theory*.

reactance, skepticism, inertia) has to be known or identified before an attempt to overcome it is made.

*a. Reactance-Fear of Change*

Reactance is the negative emotion caused by the actual or perceived usurpation of freedoms. Consequently, an individual is well motivated to resist the change being forced upon or asked of them. How it is framed, what is asked and the alternatives available have little to no impact on the reactance of a person. The fact that change is being asked or made is enough. Two reasons have been found for this: (1) nature of the threat (change) and (2) the freedoms threatened. A blatant, coercive, or unwanted attempt will produce a strong reaction while an attempt that is subtle, indirect, or justified will have a weak reaction. And the more freedoms that are threatened with change and how important those freedoms are to the individual determines the strength of reactance to the influence attempt. Thus, the best way to minimize or avoid reactance is not to raise one at all. But reactance would be raised because a change is being asked or suggested. This would be unnecessary if the targeted individual or audience behaved the way you wanted them to. Omega strategies to reduce reactance are: (1) depersonalize the request, (2) the power of “yes”, and (3) providing choices (Knowles & Riner, 2007).

(1) An influence attempt can be very personal. The communicator is asking the individual to do or change something. This can cause their defenses to go up. One way to reduce or bring down their defenses is to depersonalize the request. This can be done in two ways. The first is to remove any first-person words in the message. For example, it is the policy of the management or all employees are required to comply with this order. The second way to depersonalize the request is to disguise it in the form of a story (Knowles & Riner, 2007). The information of the request is seen less as a personal judgment by the communicator and more as suggestion. The emotion is taken out of the request and it may be treated objectively.

(2) Telling someone “no” decreases choices and increases reactance. This can be avoided by redirecting the individual with “Yes, and...” or “Yes, if...” statements. Thus, a person feels they still have choices and options open that are agreeable to them. This

should result in reduced or no reactance (Winter, Sagarin, Rhoads, Barrett, & Cialdini, 2000; Knowles & Riner, 2007, p. 92). The information here is volleyed back and forth between the influencing agent and the decision maker. The decision maker receives the first bit of information, filters it and sends it back to the agent. The agent attempts to steer the decision maker by introducing new information that leads the decision maker towards a decision that benefits the influencing agent.

(3) Finally, reactance can be reduced by providing choice. The power of choice gives the person the option of exercising their freedom. This will, in turn, channel his/her urge to resist and reject, and allow the person to behave in a manner desirable to the influence agent (Knowles & Riner, 2007). Thus, the choice is an illusion for the decision maker. Either “choice” made results in behavior desired by the influencing agent.

Overcoming reactance deals with an individual’s instinctive reaction to a request for change that is perceived as an assault on freedom. Once a decision maker is willing to consider a request then what that request wants to change becomes the issue. The next form of resistance is skepticism about the message of the change.

***b. Skepticism-Why Change?***

Skepticism about the message of change has less to do with opposing the change than about the content of the message. Focusing on the message means the person is thinking about and processing it. Three routes for processing the message have been identified. In the reasoned route, the message is carefully checked against one’s personal beliefs and experiences for internal consistency. But not everyone thinks as deeply about a message. The second route is a more heuristic route using less brainpower. People give credibility to a message based on how or who presents it (i.e., the speaker is attractive, the words or phrases used are difficult to understand) (Knowles & Riner, 2007; Pratkanis, 2007). The audience’s skepticism is reduced because of source credibility. The third route of processing the message is a variation of the anchor and adjustment heuristic or, as Duane Wegener and Richard Petty termed it, flexible correction (Wegener & Petty, 1995, 1997; Knowles & Riner, 2007). “If the person becomes aware that his or her reactions toward the target are being influenced by the overlap in reactions toward the context and

target; the person might effortfully subtract or partial out reactions toward the context from reactions toward the target (i.e., “resetting” takes place)” (Wegener & Petty, 1995, p. 37). If a decision maker knows they are biased they will try to adjust their reasoning about a message to compensate for that bias (positive or negative) (Knowles & Riner, 2007).

Omega strategies have been developed for dealing with skepticism including: (1) guarantees, (2) looking ahead, and (3) change the comparison. Several others have been identified and studied but are ineffective or ethically challenging. Deceiving or distracting someone can engender feelings of being taken for a ride and cause or increase resistance (Knowles & Riner, 2007). Thus, an influence attempt will fail if an audience feels duped or lied to.

(1) The most effective, basic, and direct omega strategy for dealing with skepticism is the guarantee. Since many decision makers are ambivalent towards a decision, the influence agent must find out what the decision maker is vacillating about and guarantee it not to be a problem or have a negative consequence. The object of ambivalence is the knowledge driving the resistance. A guarantee is the information that reduces that knowledge to a comfortable level so that a decision maker could behave in accordance with the influence attempt (Knowles & Riner, 2007).

(2) Changing the timeframe of a request can and does influence how that request is processed (Trope & Liberman, 2000; Knowles & Riner, 2007). “Distant events are evaluated according to objective (should it be done?), whereas immediate events are evaluated according to function (can it be done?)” (Knowles & Riner, 2007, p. 100). Thus, pushing out an event or decision gives a person more time to think about it. This can lower resistance because the information is not seen through a compressed frame. The information can then be considered more thoroughly and the best decision, as the decision maker views it, can be reached.

(3) Changing the comparison can be very effective but it requires the influencing agent to know what is the cause or baseline of the resistance (Knowles & Riner, 2007). If the decision maker has their baseline information about a decision as quantity, changing

the price of something will have little effect. But adjusting the amount for the same price will have an effect. Thus, the information is reframed and repackaged for the decision maker's consideration.

Skepticism is focused on the message. The decision maker is open to the facts and reasons of a request. This can have positive and negative benefits. The negative side is that a decision maker could discover reasons to reject the proposal. However, the reverse may happen. While scrutinizing the proposal the decision maker could discover reasons to accept the proposal. This is only possible if the decision maker is a skeptic. If a decision maker is only interested in keeping things the same, then the status quo is the cause of resistance.

*c. Inertia-Do Not Change*

If it is not broken, do not fix it. For a person who exhibits this type of resistance, the persuader must overcome inertia before starting an influence attempt. The decision maker does not want to change, is fine with the status quo and will not even consider a change. The reasons and logic behind the request have little or no bearing on the decision maker. It has been noted that a decision maker may acknowledge and agree with the reasons and logic of a request but still dismiss it (Knowles & Riner, 2007). Inertia is the most frustrating and hardest form of resistance to overcome because the decision maker is not interested in or does not want to engage in change. There are two omega strategies for overcoming inertia; they are: (1) disrupt inertia and (2) increase self-efficacy.

(1) Breaking through a decision maker's resistance inertia requires the influencing agent to somehow get the person involved or interested. Making an odd request or introducing confusion into the persuasion attempt can accomplish this (Knowles & Riner, 2007). An odd request or introduction of confusion could induce a decision maker to seek new, clarifying information about the odd request or to resolve the confusion; both get the decision maker involved or interested. Once involved or interested the influencing agent can introduce the new information in order to influence the decision maker.

(2) Fear of making a decision, of the unfamiliar, or of acting on that decision strengthens the desire to keep the status quo. The strategy to overcome this fear is to

increase the decision maker's self-efficacy by reminding the decision maker of a time when they made a good decision, tried something out of their normal routine, or did something outside their comfort zone that had positive results. Increasing self-efficacy weakens or removes resistance to change. Further, increased self-efficacy provides the decision maker with a sense of competence and of greater confidence in him/her-self and personal abilities to handle change. The knowledge of past successes can adjust attitude towards change from fear to consideration (Knowles & Riner, 2007).

Inertia is the hardest form of resistance to deal with due to a decision maker's insistence on looking backward and interest in maintaining the status quo (Knowles & Riner, 2007). As with the other omega strategies, an influence agent must know the type of resistance in order to effectively overcome it. Otherwise, the influencing agent will be blindly attempting to reduce the inertia of the audience, failing miserably and possibly increasing resistance by confirming to the audience that things are better as the status quo and not the requested change.

*d. Omega Synopsis*

Influencing or resisting influence requires a person to have a foundation from which to act. This foundation could be considered a social norm. If a decision maker is from that area s/he will have firm grasp and understanding of that foundation. But what about an influence agent who has never been to that area (e.g., a political candidate who must convince people across the country to vote for him)? The audience does not know him or her and s/he does not know the audience. S/he has to convince them s/he understands and shares their foundation.

**4. Social Norms-A Tool of Influence**

People living in the same area usually share the same POV/PE or something very close to the same POV/PE (Cialdini & Trost, 1998). This is because they develop norms they all adhere to (fully or partially). "It is now evident that social norms not only prompt, but also guide people's actions" (Aarts & Dijksterhuis, 2003; Kerr, 1995; Schultz, 1999; Terry & Hogg, 2000; Turner, 1991; Goldstein & Cialdini, 2007, p. 167). Researchers over the last couple of decades have produced a body of knowledge and a



general agreement on what social norms can do (Goldstein & Cialdini, 2007). Now they are looking at how social norms influence decision making and when the greatest impact on decision making may be felt. Several theories have been put forth to describe where the impact could be greatest; the relevant theories are deviance regulation theory (Blanton & Christie, 2003), social identity and self-categorization theory (Ellemers, Spears, & Doosje, 2002; Terry, Hogg, & White, 2000), and the focus theory of normative conduct (Cialdini, Kallgren, & Reno, 1991) (Goldstein & Cialdini, 2007).

Deviance regulation theory (DRT) is defined as the prediction that people will try to maintain positive public and private self-images by choosing desirable ways to deviate from social norms and by avoiding undesirable ways of deviating from social norms (Blanton & Christie, 2003, p. 115; Goldstein & Cialdini, 2007).

Thus, a person's social identity is derived from choosing to deviate from social norms. As such a person should pay more attention to these outside actions to ensure they are portraying themselves as they wish to be seen (i.e., their public image or persona) (Blanton & Christie, 2003; Goldstein & Cialdini, 2007). This means that an influence agent should accentuate the positive or negative aspects of the outside behavior when attempting to influence someone. To do this an influencing agent must know what the social norms are for an audience or given area. If the behavior the influence agent wants to push a person towards is a constructive one and is recognized as the norm then the agent should accentuate the negative aspects of not behaving in accordance with the norm (i.e., frame it in a negative light). If the behavior believed to be the norm is deleterious, then accentuate the positive aspects of not behaving in accordance with the norm (i.e., frame it in a positive light) (Goldstein & Cialdini, 2007). This allows the influence agent to successfully influence only after the norm is identified. Without identifying the social norm, any influence attempt will fail. While some seek to slightly deviate from the norm, others seek to greatly deviate from it to distinctly set themselves apart, providing that person with a sense of uniqueness (Blanton & Christie, 2003; Kim & Markus, 1999; Nail, MacDonald, & Levy, 2000; Goldstein & Cialdini, 2007).

The uniqueness of the individual is paired with that individual's identification of and conforming to the social norms of the valued group (e.g., family, school, sports team, military service) (Brewer & Roccas, 2001; Cialdini & Goldstein, 2004, 2007; Pool,

Wood, & Leck, 1998). The valued group becomes their social identity and demonstrates part of the second theory, social identity/self-categorization. Social identity is defined as “the self-concept based on membership in a social category” (Brewer, 2003; Hogg, 2003; Goldstein & Cialdini, 2007). The social identity will influence the behavior and attitude of the person that claims membership only when that person is invested in that group (Ellemers, Spears, & Doosje, 2002; Hogg, 2003; White, Hogg, & Terry, 2002; Goldstein & Cialdini, 2007). Self-categorization theory goes beyond social identity theory to converge on the activities and influences of the categorization process (Terry, Hogg, & White, 2000; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987; Goldstein & Cialdini, 2007). Thus, an individual “buys into” the social norms or rules and standards of the group (Cialdini & Trost, 1998). The individual identifies with the group, modifies their behavior to be in accordance with group standards and self-categorizes by choice.

The third theory put forth is the focus theory of normative conduct. Focus theory has two parts. In the first part, injunctive (what ought to be done) and descriptive (what is done) norms are acknowledged as having separate effects on behavior. Thus, injunctive informs member’s which behaviors and attitudes are and are not acceptable while descriptive informs the member what actions to take or avoid in a given situation (Goldstein & Cialdini, 2007). This shows that the injunctive and descriptive are processed differently. That is,

individuals focusing on descriptive norms need not engage in elaborate cognitive processing of the relevant information because applying the heuristic rule “I should do what most others do” is based primarily on the simple observations of others’ situation-specific behaviors. In contrast, acting on information provided by injunctive norms proves a more cognitively demanding course because it is based on an understanding of the cultures moral norms—that is, what others are likely to approve. (Goldstein & Cialdini, 2007, p. 171-172)

A member sees the information presented by the behavior and attitude of other members of the valued group in certain situations and stores that situation in memory (i.e., creates a mental model). That memory could contain both injunctive and descriptive information about the valued group social norms. Then s/he can recall that information when confronted by that same or similar scene (e.g., like NDM/RPD).

This demonstrates the second part of the theory, “a given norm is likely to affect behavior directly to the extent that it is focal in attention” (Goldstein & Cialdini, 2007, p. 171). The behavior, attitude and what is expected of that member will be center stage in their picture and drive the resultant behavior. Accordingly, effectively influencing a person or group requires the knowledge of what the norms are and which norm, injunctive or descriptive, aligns best with the desired end state. The best use of norms, if it could be done, would be to use the injunctive and descriptive and align them with each other and the desired end state (Goldstein & Cialdini, 2007). This can be difficult because the information required would be large and the influence attempt is typically conducted under a time constraint. If the attempt takes too long in construction, then the window for influencing is lost. Or if the social norms change due to a change in environment, perceived or forced, then the information becomes useless and the influence attempt will fail.

#### **D. CONCLUSION**

Reaching the desired end state requires knowing who or where to influence. Most times, but not always, the decision maker who needs to be influenced is a top level decision maker, such as political or military leaders. Influencing them can be accomplished through a variety of means in the information environment, composed of the physical, cognitive, informational dimensions. Changing public opinion at the level of the valued group (e.g., local and national) of the target decision maker is one avenue but this is difficult without knowing that group’s social norms, values, and how they see themselves. Given enough time an influencing agent could reduce resistance to the influence as long as the specific resistance has been identified. All of the avenues to influence a decision maker’s decision start with information. Without the information to ignite and fuel decision making; knowing all the techniques of influence, how a picture develops, what is included in it and the process to reach a decision is useless.

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## **IV. ANALYSIS-THEORIES, MODELS AND INFLUENCE**

### **A. INTRODUCTION**

A decision maker may use a decision model naturally, that is to say, it is a subconscious use of a model. However, the conscious decision to incorporate a model into a personal decision making process or to analyze an opponent's decision making process, needs to be carefully considered. The authors of the various models/theories patterned the model/theory off either ideal thoughts of what should be or analyses of decision making in real world actions/observations. The rest of this chapter will examine selected models/theories to allow a comparison of the key aspects of each model/theory. The models/theories examined are NDM/RPD, decision making under risk, and OODA/CECA.

NDM/RPD features how experts make decisions in the real world and provides a template for training laymen to become experts (the type of training the military stresses). Decision making under risk is an ideal thought model that describes identifying, mitigating, and avoiding unnecessary risk to stay as safe as possible while continuing to complete assigned missions. The OODA framework can be used in an ideal thought exercise or in the real world, and is used almost universally in the military from the senior most level down to the most junior level. Finally, CECA is a military specific model that represents large, complex operations used as an ideal thought exercise or in operational settings.

All of the models/theories examined have things in common that a decision maker has to know or figure out prior to reaching a decision. I propose that these pieces of common information are the common criteria. They are:

- Identification of the scene (situational awareness)
- The desired end state (objective)
- How to reach the desired end state (the plan)

These may seem readily apparent when thinking about a problem in a stable, unchanging classroom environment but history is replete with examples of decision makers deciding to act without knowing one or more of these three fundamental pieces of information. A situation must be identified accurately to address it properly. The desired end state has to be known in order to reach it. However, the end state and path to get there can and, often do, change due to new information. These common criteria are intertwined with each other and it is at this point that the effect of choice of decision making model can be found. Some models will begin the process with one or more of the common criteria known. However, the situation will dictate the amount of information known. Additionally, decision makers are influenced by the three dimensions of the information environment:

- The physical dimension (who delivers it)
- The informational dimension (the information itself and the timeliness of it)
- The cognitive dimension (how information conflates with the model)

The physical and information dimensions affect the models/theories in relatively similar ways. The cognitive dimension, where the decision is made, affects the models/theories differently. The similarities and differences between the models/theories will be considered in the following section.

## **B. SIMILARITIES AND DIFFERENCES**

### **1. Similarities**

The physical and informational dimensions have similar affects regardless of the model/theory used. The principles behind the dimensional aspects are the same but the result might not be due to the individuality of the decision maker, his or her staff, and their lines of communications. The physical dimension aspect of who delivers the information affects the decision maker in each model/theory by increasing or decreasing the amount of truth the decision maker ascribes to that information. This is important because a decision maker can be influenced by having the right person deliver the wrong information or vice versa, resulting in under or over-evaluation of the information. This skews the rest of the process.

The informational dimension also has similar affects across the models/theories in aspects of the information itself and the timeliness of delivery. The impact of the information itself is recognizing and understanding the importance of that information thereby allowing the decision maker to reach the most beneficial decision. It is critical because a decision maker may have the information but not recognize it and/or not understand the importance. This would prevent the decision maker from reaching the decision that benefits them and/or they would make a decision that could possibly harm them. The second informational dimensional aspect of timeliness is when the decision maker gets the information: early, late, or not at all. The effect this has is what the decision maker can do with the information. If the information reaches him or her too early it could be ignored, overlooked, or forgotten. If the information is too late or never reaches the decision maker, then the information is not added to the picture or considered and is useless. The result of any of these is a decision made without the decision maker considering all the relevant information. That means any model/theory used will not result in the best decision possible for the decision maker.

## **2. Differences**

The cognitive dimensional aspect of how the information conflates with the model affects the models/theories differently because the models/theories are designed to reach a decision differently. The decision maker or an advisor has to be trained in, or exposed to, the use of the model/theory. Each requires a different level of training and with it, a different thought process. NDM/RPD and OODA/CECA are the models/theories that require training in and, for the best results, prior use of the model/theory. This means a decision maker or aide would think about the situation in similar but still unique way due to their own individual experiences. For decision making under risk, a decision maker that has been trained to use it but has no previous experience with it or the situation can use risk decision making. S/he could apply their training and reach a quality risk decision in a reasonable time that would not harm the mission. The cognitive dimension demonstrates each decision maker's individuality in the decision making process and that is the greatest difference in the models/theories.

## **C. LENS OF COMPARISON**

The selected models/theories will be compared through the lens of the situation, common criteria, and the decision maker. The situation begins the decision making process. The common criteria have to be answered in order to use the model/theory effectively. The final lens used for comparison is the decision maker because the individual decision maker uses each model/theory differently.

### **1. Situation**

The model/theory is chosen because a new situation is encountered or expected that may or may not have been encountered before. The models/theories handle each situation differently based on whether or not it has been encountered before. In NDM/RPD the situation may have been encountered before, be expected, have similarities to a prior situation, or be totally unexpected. Some situations will be resolved more quickly than others. A previously encountered situation can be resolved more rapidly than other situations because the situation has been solved in the past and a mental template for how to solve the current situation has been created. The decision worked once and could work again. An expected situation works in much the same way as a previously encountered situation. However, because an expected situation has only been thought about the solution to an expected situation may not work. If the situation has not been previously encountered, but has similarities to a prior situation, mental models of similar encounters still serve as the template for solving the current one. However, in situations that are unexpected and have not been encountered in the past, no template exists. In this case, a decision can still be reached based on the decision maker's ability to make decisions. The difference is the time it takes to reach a decision and the quality of that decision.

The previously encountered or similar situation will produce faster and higher quality decisions than situations not previously encountered. An expected situation acts as a previously encountered one that has a template for being solved (but has yet to be proven.) The unexpected, unfamiliar situation will take the most time to reach a decision. A decision reached in a short time period will not be a high quality decision but it will be



a decision (if one has to be made in short order.) The more time a decision maker has to make a decision, the higher quality it could be.

Decision making under risk is used only for expected or previously encountered situations because the model is to be used prior to encountering a situation. That previously encountered situation serves as a template for the expected situation. In this model/theory, the decision maker has already analyzed the previously encountered situation as a part of training or through experience. Thinking about or experiencing it is the only way to gain proficiency in the execution of this model/theory. This means a decision maker can use the model/theory successfully on short notice if the decision maker has thought of or experienced a situation similar to the new one. Thinking through or dissecting the previous experience before encountering or executing it again enables the model/theory to work as designed. If the situation has not been thought about before the encounter, this model will not work.

OODA/CECA works with any situation. These models are used to plan for an expected or previously encountered situation or respond to an unexpected one. If the situation is expected, like NDM/RPD and risk decision making, a template exists to solve it and the information required is known or a decision maker could recognize what is needed. If the situation has never been encountered or thought of, the decision maker can reach a decision but it will take time, much like NDM/RPD (the difference being the decision maker; which will be explored in the decision maker section). However, if a new situation occurs, OODA could be used to respond but CECA could not. OODA could be used because it is a simpler design that requires less information and prior planning on the part of the decision maker. CECA could respond to a new situation if it has been previously thought about and, at least, minimally planned for (i.e., if-then statements). If not, using CECA would take too long to go through the model and decide on a response.

New situations can be handled using NDM/RPD, OODA, and, possibly, CECA. Risk decision making should not be used in response to a new situation (but could if the decision maker has experience with a situation similar to the new one) because it is not designed to do so. NDM/RPD can be used as long as the decision maker is an expert in or familiar with it (or has the expert/laymen near enough to use him or her effectively

during the process). OODA can be used in a new situation only when the decision maker has been trained to use it. Not using OODA properly will lead to a bad decision. CECA could be used for a new situation as long as the new situation occurs as an event inside a situation that has been planned for. This means CECA is flexible enough to respond to a new situation but should not be used if no prior planning was conducted. The situation will point the decision maker towards a model/theory that could be used to reach a beneficial solution.

## **2. Common Criteria**

The decision maker has to answer the common criteria to reach a decision. S/he is affected by the common criteria because they are the first steps in using the models/theories that s/he uses to make a decision. Not answering one or more will prevent a decision from being reached or cause a poor decision to be made and negate the use of a decision making model/theory. NDM/RPD is very dependent on quickly identifying the scene in order to lay the groundwork for the rest of the mental model used by the decision maker. This enables him or her to begin retrieval of the mental models of the same or similar situations. That, in turn, sets expectations about and filters for information coming from the scene. Once a decision maker has that understanding s/he can answer the other common criteria by deciding on an end state and how best to reach it. If new information changes one of the common criteria the decision maker can adapt to the change and reach a decision.

Decision making under risk has the advantage of answering all three common criteria from the beginning. The design of risk decision making requires the decision maker to know what the situation is, what the end state is or could be, and how to get there in order to identify risks and ambiguities. This information can then be used to further sharpen the difference between risk and ambiguity through the use of the directed telescope (if necessary.) Risk decision making only works if all the common criteria are known before a situation occurs, which means they can be planned for. Not knowing the common criteria means the decision maker cannot assess the risks of a situation properly, potentially leading to disastrous and costly consequences.

OODA/CECA, like NDM/RPD, depend on the identification of the scene before answering the other common criteria. Contrary to NDM/RPD, the speed of identification is not as important. Once the scene has been identified, a decision maker can use the model as designed to reach a decision. If new information changes the identification of the scene and the other common criteria, OODA/CECA can respond and adapt to it to a point. OODA is far more responsive and adaptable because of the relatively small amount of information needed to use it. This means OODA can answer the common criteria quicker in order to reach a decision on which to act. CECA could respond and adapt to a new scene if it has been considered before happening. CECA is designed to be used in strategic level decisions, not necessarily the tactical ones as OODA is designed for.

Answering the common criteria rests on the identification of the scene (situational awareness.) That identification enables the rest of the common criteria to be answered. NDM/RPD and OODA/CECA have the capability to respond to changing and new information from or about the scene. Decision making under risk is very inflexible and slow to respond (if at all.) If identification of the scene changes too close or while the situation is occurring, all decisions made are doubtful unless the original scene identification is similar to the actual one. If the scenes were close enough to each other, then some of the decisions made would still be applicable. Lastly, all the models/theories require the common criteria to be answered to reach a decision. Not answering one will slow the decision cycle down and could lead to a bad or no decision.

### **3. Decision Maker**

The decision maker is a unique individual with different experiences, biases, and beliefs. A cabinet or council of advisors that s/he has chosen or been provided with could support them. This council also has experiences, biases, and beliefs that could influence the decision maker and the decision. The decision maker determines which model/theory is used through subconscious (untrained) choice, trained choice, or dependence on the chosen council (untrained or trained decision making).

In NDM/RPD, the trained decision-maker has expertise and/or familiarity with the situation or has to have an expert in his or her cabinet to filter and interpret the

information. If the decision maker is not the expert and does not have access to one, use of NDM/RPD to reach a decision will fail.

Risk decision-making follows the requirement for being trained in use of the model/theory. A decision maker can have little or no experience with the situation and could use this model/theory effectively since all of the common criteria have to be answered in the beginning. This also means a decision maker has the time to use the directed telescope to find information about the situation, possible risks inherent to and because of the situation, clarification of something as a risk or ambiguous and mitigating actions that could be taken. While not necessary, a decision maker familiar with the situation will use that model/theory more effectively and more quickly. If s/he is not trained in the models/theories use, s/he cannot reach a decision that accounts for and mitigates the risk to a situation.

OODA/CECA is in line with training in the use of the model/theory. The decision maker using OODA is at the tactical level, while the decision maker using CECA is, most likely, at the strategic level. OODA can also be used at the strategic level but is designed for the tactical level. Consequently a decision maker could be more familiar with OODA and prefer it to CECA. This would change how the decision maker looks at a situation and what information is needed to reach a decision. If OODA is being used at the tactical level, the decision maker is probably at the scene or very close to it so as to interpret the information without having it pass through multiple filters or be influenced by cabinet members or advisors. This means s/he can reach a decision faster and implement that decision. If OODA is being used at the strategic level, then a decision maker is receiving information that has passed through multiple filters and could be or has been influenced by cabinet members.

CECA was designed to be used by the military above the tactical level. CECA has defined steps that are complex, have to be followed and answered in a certain order to be used properly. As such, certain aspects of the design need to be considered by the decision maker. First, the decision maker has to understand that the information is filtered. This means the information that s/he is receiving has been filtered by the cabinet and may not be the right information due to how and who filtered it. Second, the decision

maker has to understand how that, if s/he has been allowed to choose the cabinet, the physical aspect of who delivers the information will be enhanced. But if cabinet members have assigned by a decision maker superiors, the physical aspect will have a diminished effect. Both of these have to be understood by a decision maker in order to use CECA effectively. The decision maker does not have to be an expert or familiar with the situation but probably is because the situation would have to have been thought of prior to it happening. Thus, the decision maker and his or her cabinet could have thought through the situation and smoothed out the mechanics of communicating information to the final decision maker in a manner personalized for him or her.

A decision maker's use of a model/theory depends on the decision maker and his or her cabinet. Their collective experiences, biases, and beliefs will interpret the information that is presented and accept or reject the information. The cabinet supports the decision maker and the model/theory s/he chooses, which will be the model/theory s/he believes will be best to reach a decision that benefits them.

#### **D. ANALYSIS CONCLUSION**

The selection of one model/theory over another for incorporation should be based on the new or expected/known situation, the ability to answer the common criteria, and what process the decision maker uses to reach decisions. With this in mind a decision maker first has to understand how s/he processes information and builds a mental model based on information that may or may not have been filtered before reaching the decision maker. Then, a decision maker can handle or learn to handle situations, and what questions they need to ask and/or who to ask to get information that answers the common criteria. Education in decision-making models and theories can add to the expertise of the decision maker. In this way, the decision maker can use the various models/theories to reach the best possible decision.

Tables 2–4 show how information affects the model/theory based on the situation, common criteria and decision maker. The information that a situation is new or expected/known will drive how much of the common criteria needs to be answered, and what information the decision maker requires to successfully reach a decision using a model/theory. It further lists reasons to use or not use a models/theory for a given situation, when to use it, and the most likely reasons a bad decision or no decision was made. The tables further demonstrate that the common criteria have to be answered before reaching a decision, a decision maker can begin a decision making process by answering at least one of the three criteria.

## E. TABLES

Situation	Common Criteria	Decision Maker	Positives Negatives	Risks to Success
New	Identify the scene accurately and quickly.	An expert or laymen, or access to an expert or laymen.	<div>Pos: Options for solving already exists or can be generated quickly.</div> <div>Neg: If the scene is not accurately identified, the decisions made would not be the most beneficial.</div>	<div>1. The scene is not identified accurately.</div> <div>2. The decision maker is or does not have access to an expert or laymen.</div>
Expected /Known	All should be answered and contingencies should have been planned (if-then statements).	An expert or laymen, or has already consulted with an expert or laymen.	<div>Pos: A plan for solving has already been developed or a mental template exists.</div> <div>Neg: The decision maker, expert, or laymen could make a bad plan or recall the wrong mental template.</div>	<div>1. The scene is not identified accurately.</div> <div>2. The decision maker is not or does not have access to an expert or laymen.</div> <div>3. The wrong mental template is recalled.</div>

Table 2. Naturalistic Decision Making/Recognition Primed Decision Making

Situation	Common Criteria	Decision Maker	Positives Negatives	Risks to Success
New	Cannot use this model/theory with a new situation.	Cannot use this model/theory with a new situation.	Pos: None	The new situation cannot be assessed and planned for.
			Neg: Cannot use model/theory.	
Expected /Known	All are answered and planned for.	Knows how to use model/theory and can identify/distinguish risk and ambiguity.	Pos: Risks and ambiguities have been identified, assessed, and a plan to mitigate them has been made.	1. Risks and ambiguities have not been identified and planned for.  2. The decision maker has not been trained to use this model/theory.
			Neg: 1. All risks and ambiguities may not have been identified and a plan to mitigate them has not been developed.  2. Risks are assessed as too great to continue mission.	

Table 3. Decision Making Under Risk



Situation	Common Criteria	Decision Maker	Positives Negatives	Risks to Success
New	Identify the scene quickly and accurately.	1. Knows how to use the model/theory.  2. Can quickly proceed through the steps.	Pos: 1. Flexible.  2. Can make decisions faster than opponent.  3. Little information is needed to complete the steps.  Neg: 1. Scene could be misidentified.  2. Proceeding through the steps could be slow.	1. A decision maker is not trained in how to use the model/theory.  2. Moving too slowly through the steps.  3. The scene is misidentified.
Expected /Known	All should be answered and contingencies should have been planned (if-then statements).	1. Knows how to use the model/theory.  2. Has a plan with contingencies, and can recognize indicators that invalidate the plan.	Pos: A plan with contingencies and indicators is in place.  Neg: 1. Plan could not work.  2. Contingencies could fail.  3. Indicators could be missed, or not recognized.	1. A decision maker is not trained in how to use the model/theory.  2. Moving too slowly through the steps.  3. The scene is misidentified.

Table 4. Observe-Orient-Decide-Act/Critique-Explore-Compare-Adapt (OODA/CECA)

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## V. CONCLUSION

This thesis explored the differences in the theories/models of decision making and the role of information in influencing decision making. The review of relevant models and theories, exploration of what goes into the decision-making picture, and various T/T revealed commonalities that every decision maker has to answer and influences that should be understood regardless of the model/theory used. Finally, an analysis of selected models/theories was conducted through the lens of the commonalities discovered to expose how information influenced the decision making process when using a selected model/theory.

Information is the most important piece of the decision making process and the most malleable. Research and real world experiences have proven this through the successful influence of target decision makers and audiences by manipulating the information with various T/T. The success of the T/T is due to the manipulated information as it intersects and interacts with the target decision maker or audience. They see the information in a certain way and decide to behave in a manner that reaches the desired end state of the designed influence. There are many possible combinations to accomplish this but all of them revolve around manipulating information.

This knowledge enables an influence attempt to be tailored to a targeted decision maker or audience. The various combinations provide an expansive set of choices (T/T) on how to manipulate the information in order to reach a decision maker or audience. Thus, the predominate sub-processes of IO can and do work to elicit the desired behavior from the targeted decision maker or audiences and attempts to use the same or similar sub-processes can be recognized prior to the influence taking place; resulting in increased protection of United States and our allies decision making capability.

Therefore, information is the impetus to begin and the fuel to keep the process going until the decision maker thinks s/he has enough information, correctly interpreted to make the decision that benefits them or their goal to reach the desired end state. While information begins and sustains the decision making process, the decision maker controls

it by conflating the answers to the common criteria, the theory/model used, and his/her response to the information environments with the individual and collective biases of the decision maker and his/her advisory group.

#### **A. RECOMMENDATIONS FOR FUTURE RESEARCH**

Recommendations for future research:

- This thesis analyzed only four of the eight relevant models and theories of decision making that were found. Future students could conduct an in-depth analysis of the other four models and theories to explore how information influences them.
- Conduct further research of available literature to identify more models and theories used in decision-making based on culture or region of the world.
- Utilize NDM/RPD in order to develop an initial training pipeline that will be the baseline training for new junior officers in the Surface Warfare community. The goal of which is to produce junior officers that are aware of and have been exposed to the needs and demands of shipboard service similar to a newly winged pilot (familiar with divisional administration, shipboard programs, qualified in ship wide basics: damage control, material & maintenance, weapons qualifications, and a basic understanding of the handling characteristics of assigned platforms).
- Develop a course of instruction to expose aspiring leaders to the decision-making process. This should include an overview of the various models and theories that could be used, an explanation of what a mental model is and what goes in it, the information environment and the affects thereof, and how to understand what kind decision maker they are and could be.

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